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The Engineering and Mining Journal

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The Iron and Steel Institute's Statistics for 1912

The American Iron & Steel Institute has already begun on the statistical work which it has taken over from the American Iron & Steel Association, and has prepared a statement of the production of steel and finished material for the first half of 1912, the figures from which are given on another page. In this work the institute has followed the lines laid down by James M. Swank, so long manager of the old association. This, of course, is natural and commendable, as it continues the statistics in their familiar and accustomed form, and that form is one which proved to be convenient and acceptable to the trade.

The statistician of the institute, however, seems to be desirous of extending the work by comments on the result, where Mr. Swank was content simply to present the facts, leaving others to draw inferences. This is evidently to be a feature of the new reports. for the preliminary statement issued promises further comment and analysis at an early date. It may be questioned whether this will be an improvement, and whether the clear presentation of the facts is not properly the whole object of a statistical work like this. Comment and analysis must be, after all, the expression of individual or group opinion, and may often fail of general acceptance. It should at least be carefully separated from the presentation of the facts.

In this statement of the institute the steel and finished material productions are for the first time given for a half-year. Heretofore they have been published by yearly periods only. This prevents any effective comparisons with the first half of 1911. Some attempt at such comparison is made by taking one-half the production of 1911 as a basis; but that this is not by any means a close comparison is evident when we consider the conditions of the trade.

The steel production of the half-year was the largest on record. Briefly summing up the detailed figures given elsewhere, we made in the first half of 1912 a total of 14,373,701 tons of steel; 33.9% of this total being acid bessemer or converter steel; 3.6% acid openhearth; 62.1% basic openhearth and 0.4% miscellaneous, which includes crucible steel, electric steel and a small quantity made by various special processes. The special point is the continued growth of the openhearth process. Up to 1907 more than half our steel was made in the bessemer converter. From that year on the openhearth furnace has had the lead, until this year bessemer steel is only about one-third of the total. Another point in the statement is that the half-year's make of steel exceeded that of pig iron by a little over 300,000 tons. This was due partly to the drawing on stocks of pig iron brought over from 1911, and largely to the use of steel scrap in the openhearth furnaces.

The make of finished rolled products for the half-year was also large, the total being 11,201,819 tons, of which 10,722,338 tons were steel and 779,481 tons wrought or puddled iron. These totals include only finished and merchantable forms, and not steel sold by makers in half-finished shape, such as blooms, billets, sheet bars and similar forms sold to be further worked into shape. The leading products in the order of their quantity, were plates and sheets, bars, rails, structural shapes and wire in various forms. In quite a number of cases record productions were made, so far as comparisons can be instituted. Rails, however, showed but little gain. The most noteworthy feature about the make of rails was the increase in the proportion of openhearth steel used, which was this year 63.2%, while as recently as 1908 it was only 29.4% of the total.

The publication of these figures half-yearly will undoubtedly be of advantage to the trade; and they appear with a promptness which is commendable, con-

sidering the labor required to collect and prepare the figures.

American Institute of Mining Engineers

As we reported a few weeks ago, Dr. James Douglas sent to the members of the American Institute of Mining Engineers a circular letter pointing out that the necessity for any increase of dues would be obviated by voluntary subscriptions to settle the debt due on the Institute's share of the cost of the land on which the United Engineering Building stands. Doctor Douglas has informed us that he sent out about 4100 letters. Up to date replies have been received from 247 members, of whom 189 promised subscriptions. Some of these have been for large amounts, but most of the subscriptions have been confined to the $25 per member as suggested by Doctor Douglas in his circular. Regrets of inability to subscribe were received from 58 members. It is significant that a large number of these expressed their financial inability to contribute and several stated their fear of compulsory resignation in case the dues were raised.

Answers continue to come in daily, but as yet only about 3½% of the members have subscribed. Their response has been liberal and gives good ground for the hope that if the members who are still undecided as to their response would imitate the example of those who have replied, the financial status of the Institute would be immediately placed upon a satisfactory basis.

As we have previously pointed out, the membership of the Institute owes this money. The sum originally owed was much greater, but has been reduced by the generosity of some members and their friends. It will be too bad if the membership will not settle the remainder of its obligation, which was incurred by its own vote. Let every member at least do his duty. Let those be generous who can afford to be. And especially, let prompt attention be given to this matter in order that an announcement may be made at the meeting on Oct. 7 that the indebtedness of the Institute has been settled and that the organization is thereby enabled to march onward without a retarding load.

The Copper Statistics for August

The copper statistics for August are as surprising because of the large production of refined copper reported, as were the monthly statistics previous to July surprising for the smallness. The production of crude copper by the miners and smelters has not yet attained 145,600,000 lb. in any month, wherefore the only inference is that the refiners began in August to draw upon the accumulation of crude material.

In carrying an accumulation of copper, provided that a sufficient quantity of refined be kept on hand to enable commercial requirements to be freely met, it is, of course, most economical to carry the remainder in a crude form if the cost of transportation and refining exceed the value of the precious metals locked up, which is the case in respect to the crude copper from several important districts.

The production reports of the refiners in July and August have fully confirmed previous inferences as to the excess of mine production, which ought normally to have become apparent in the refinery statistics as early as last April. We think that this has been singularly unfortunate, because if the refinery production figures can be rendered so misleading, the suspicion will arise that the delivery figures will also fail sometimes to represent what they ought to.

Thin Lined Blast Furnaces

Recently in the metallurgy of iron there has been a good deal of attention given to thin-lined blast furnaces, which are considered to offer advantages, in the opinion of some metallurgists. Thin-lined water-cooled stacks have been advocated for over a decade by certain German designers, but there was no construction of this sort in America until 1908. The Eastern Steel Co., at Pottstown, Penn., has erected a furnace of this type cooled by water flowing down a spiral trough around the furnace shell. The Illinois Steel Co., has a thin-walled furnace cooled by water sprays from a series of circular pipes, thus increasing the thickness of the water curtain as the bosh is approached. Some other furnaces of this type are in use in this country, and recently the Detroit Steel & Iron Co. followed much the same lines in remodeling its "A" stack.

We are inclined to think that these may be only sporadic experiments rather than the forerunners of a new type that will come into general use. Anyway, some of the leading iron metallurgists are distinctly skeptical. Some are of the opinion that the thick lining of the furnaces of present use has advantages that outweigh the good points of the thin-lined furnaces, and that on the whole the construction of the latter is inferior. The trend of good opinion seems to be to stick to the thick-lined furnaces rather than to follow the pioneers who are experimenting with the thin-lined furnaces.

It is said to be an ill wind that blows nobody some good, but often there are winds that blow good to many people, although, perhaps, in different degrees. Thus, the recent rise in the value of lead, which seems to be based upon economically sound conditions, has been of benefit to all miners and smelters, but likely to none so much as to the International Smelting & Refining Co. This company went into the lead-smelting business about a year ago, and in the first place had to accumulate a large stock of ore pending the completion of its smelting furnaces, and then had to pile up many tons of base bullion while its refinery was in process of erection. The refinery will presently be put into operation and will convert the accumulation of the company into its final marketable form. In the meanwhile, the company has experienced a fine appreciation of value while the stock has been on its hands.

The Chinese Republic is to be added to the list of gold-standard countries, if the currency plan submitted by the Board of Finance is approved. This plan provides that the standard unit is to be a gold dollar having the same value as the Japanese yen, which is equal to $0.498 United States currency. There is no provision, however, for gold coinage, and it does not appear that there will be any immediate demand for gold currency. The silver dollar, which will doubtless be the chief circulating coin for some time to come, is to have the same value, 49.8c. United States currency; by weight the ratio of gold to silver fixed is 29.3. The dollar is to be divided into 1000 cash; one-cash pieces will have a value of 0.05 cent of our money.

By the Way

British patent No. 18,614, the London *Mining Journal* reports, is for "riders" for steadying "bowks" or "kibbles" in pit shafts. We presume these will be used for hoisting ore that was indicated by "shines" and produced "chats" when being milled.

The finest collection of minerals in the United States is believed to be that in the American Museum of Natural History in New York, the basis of which was the famous Bement collection. There are several important private collections. Among those, that of Col. W. A. Roebling, Trenton, N. J., is considered to be the best; anyway, the largest. Next in rank are probably the collections of A. F. Holden, Cleveland, Ohio, and Fred A. Canfield, Dover, N. J. Mr. Canfield's collection is especially strong in specimens of the minerals of New Jersey.

Several years ago the priest of the parish of Telluride, Colo., was attempting to raise funds for the purchase of a bell for the church. He was asking each miner in the camp, among whom were a number of Cornishmen, to donate a day's pay, writes an engineer. Upon accosting "Elic," the following conversation ensued: "Elic, all the boys in the camp are giving me an amount equal to a day's pay, and I would like you to give me the same." Elic replied, "'Ell what i given 'ee dys wages fer?" "Well," said the priest, "we will use the money to buy a bell for the church." "'Ow much bluddy bell costen," Elic asked. "About $300," the padre replied; upon this information Elic whistled and replied, "Damme, why in 'ell don't 'ee buy a bluddy 'ooter?" (Whistle).

The United States is the greatest coal miner, this country producing about two-fifths of the world's output. According to the U. S. Geological Survey, the United States has held first place in the coal-producing countries of the world since 1899, when this country supplanted Great Britain. In 1911 the total world's coal production amounted to approximately 1,302,500,000 short tons, of which more than 80% was produced by three countries, the United States, Great Britain and Germany. The United States production in 1911 was approximately 500,000,000 tons, that of Great Britain slightly over 300,000,000 tons, and that of Germany about 258,000,000 tons. Since 1899, Great Britain has increased its output about 50%, and Germany over 175%; the United States increased its production over 250% during this period.

A London syndicate, with a capital of £2000, having been formed to acquire options in Nigeria, dispatched an engineer to inspect a property it had obtained the right to purchase. Within a few weeks of his arrival, says the *Canadian Mining Journal*, the following cable was received: "Property absolutely valueless. Coming home." As may be imagined, this caused considerable disgust, but the chagrin soon changed to joy when a further cable was received, announcing that the engineer had been eaten by cannibals. He was insured for £3000, and out of this sum the shareholders were paid their first and final dividend of 150%. It is to be hoped that the publication of this story will not have the effect of causing a great run on mining engineers, with the object of sending them, heavily insured, to inspect and report on properties in countries where they are likely to be regarded as additions to the visible food supply. At the same time there are some that might be spared and even the most worthless of us may have his uses.

Discussing the heavy blast-furnace construction at Great Falls, Mont., R. L. Lloyd said that the low repair record of these furnaces was proof positive that it was worth while, though he thought at first it was too heavy and said so to W. J. Evans, at that time superintendent of construction for the Amalgamated Copper Co., and for many years associated with Mr. Klepetko in roasting- and smelting-furnace design and construction. This remark to Mr. Evans brought out a rather curious answer, which was as follows: "Young man, if you will take my advice, when you build anything, build it strong enough; if you get it too strong, nobody will ever find it out; if you do not get it strong enough, everybody will know all about it." Mr. Lloyd replied: "Mr. Evans, that is not good engineering," which elicited the further retort: "It may not be good engineering, but it's damn good sense," followed by a hearty laugh and then his serious explanation, which was that when one is dealing with furnace construction one is dealing with what he was pleased to call "red-hot mechanics," and that the usual factors of safety, as used in regular engineering practice, are not at all adequate for such work.

In the announcements of the incorporation of the $30,000,000 Universal Chemical Co., which will utilize the Newberry-Fishburne process for the manufacture of fertilizer from phosphate rock without the use of acid, several papers unauthoritatively announced that Dr. Harvey W. Wiley would be one of the directors. This has called forth an official denial from Doctor Wiley, who is quoted by the *Oil, Paint and Drug Reporter* as follows: "Some gentlemen from Chattanooga called on me about a month ago and told me of their plans. They said that they would like to have me associated with them. I got all the papers and other information regarding their patent, obtained the analytical work of their expert and hired an expert of my own to investigate the proposition. The reports were uniform; the fertilizer they proposed to sell was satisfactory. I then told them that I would go in providing three conditions were fulfilled: That the company have sound financial backing; that all of the stock and bonds be subscribed before I entered, as I did not proposed to have my name used as a part of a stock-selling plan, and that I should have entire charge of the chemical work, and that any statements made regarding the product have my approval before being used. I did not care to have anything to do with the business end of it, and if I had gone into the company my financial interests would have been small. When my attention was called to the fact that my name appeared in connection with the company, I said that I knew nothing about it. . . . I have written the company's backers that if that is the way they do business I wish to have nothing to do with the matter. I was interested because the soluble-phosphate fertilizer which they were to make and sell promised to help the farmer. I am a farmer myself, and if I can do anything to help farmers I want to do it." Doctor Wiley said that a $30,000,000 corporation was a little out of his class. "I am not a millionaire. My connection with this institution puts me in the position of the darky who was asked to change a $10 bill. 'Ah can't change it, suh, but Ah'm pow'ful 'bliged fo' de compliment.' I cannot see that a monopoly can be obtained, as practically the same process is patented in a dozen different countries."

Last year, we published a brief description of the Reid electric smelter and expressed some doubts as to whether it had been developed to the point of commercial practicability. In a Denver paper, there appears an interview with a certain Colorado mine operator who saw some things we did not—at any rate, he reports them differently. He is credited as saying, in part: "The ore, crushed to ¼ in. or smaller, feeds downward through a pipe and the instant it comes in contact with the part that is charged with electricity the ore begins to smelt. A heat of from 3000° to 6000° F. or more is created. It melts all the minerals, and the rock or silica is practically burned to ashes. Below the smelter is a tank filled with water to which water is added continuously. As the molten matter drops into the water it creates an explosion which separates the ashes from the mineral. . . . . There is no doubt that the smelter will melt, but as to the cost and percentage saved I must take the inventor's figures. He claims a saving of practically 100%." (All new processes expect to make "practically 100% saving"). It may not be amiss, the interviewer adds, to state in this connection that there always seems to be some hitch with the Reid smelter that prevents anything more than a casual run, therefore no person with whom he has talked has been able "to see very much."

W J McGee

W J McGee died at Washington, Sept. 4, aged 59 years. He was widely known as a scientist and author of extraordinary versatility, having made a reputation in several fields. He was born on a farm in Dubuque County, Iowa, and attended country schools in Iowa for a short time, but his education was chiefly acquired by private study, which he commenced while engaged in farm work. While continuing his country life, he studied Latin, higher mathematics, astronomy, law and surveying, appeared as attorney in courts, and worked at land surveying in 1874-76. He invented and patented a number of agricultural instruments, working at forge and bench from 1877 to 1881. He made a study of geology and archæology, and from 1877 to 1881 he made a geological and topographical survey of Northeastern Iowa, the most extensive ever executed in America up to that time without national or state aid, covering 17,000 square miles.

After examining and reporting upon the building stones of Iowa for the tenth census, Doctor McGee, in 1883, become geologist in the United States Geological Survey, and was engaged seven years in surveying and mapping in the southeastern section of the United States; he also compiled geological maps of New York. In 1893 he was appointed ethnologist in charge of the Bureau of American Ethnology, during which he explored Tiburon Islands, Gulf of California, where he made a study of a savage tribe never before recorded. He also investigated the Charleston earthquake. In 1903 he resigned from the bureau to become chief of the Department of Anthropology in the Louisiana Purchase Exposition, at St. Louis.

When the Inland Waterways Commission was created in 1907, Doctor McGee was appointed a member by President Roosevelt, and at the same time he was appointed soil expert in the Department of Agriculture. He was later made secretary of the commission and held that position to the time of his death. He was one of the most effective advocates and promoters of organized effort among scientific men. He was president of the American Anthropological Association, vice-president of the National Geographic Society, vice-president of the Archæological Institute of America, one of the editors of the *National Geographic Magazine*, and member of many other societies, and one of the founders of the Geological Society of America and the Columbia Historical Society. He was the author of many important works.

Doctor McGee never had a given name other than the initials "W J" by which he signed his name, and also insisted that he be addressed by those initials without periods after them. He was married in 1888 to Anita Newcomb, a noted physicist, daughter of the late Prof. Simon Newcomb. Doctor McGee left a will bequeathing his body and brain for anatomical and scientific study to Dr. Edward Anthony Spitzka, the famous Philadelphia anatomist and neurologist. He also bequeathed to Doctor Spitzka the brain of Maj. J. W. Powell, former director of the Geological Survey, which had been in his possession since Major Powell's death several years ago.

International Association for Testing Materials

The congress of the International Association for Testing Materials was held in New York last week. This is the first congress of the International Association to be held in America. In effect it represents the first occasion on which the American membership, the largest contingent upon the association's roll, received a recognition commensurate with its numerical importance. In committee representation and other activities of the association, America has played a very minor part indeed.

The work of the sixth congress may be concisely summarized by the statement that in number of papers, 153, it contained roughly twice as much as the preceding congress and in results of work of technical committees it was at least equal to any of the previous congresses.

The first official act of the congress was to make Acting President Howe the president of the association, an act which was beyond the constitutional power of the governing council, after the death of the regularly elected president, Dr. C. B. Dudley, and had therefore to be deferred until the congress convened. The congress accepted the invitation of the Tsar of Russia to hold the next congress, in 1915, at St. Petersburg, and elected Dr. N. Belelubsky, of St. Petersburg, president of the association for the next three years. Prof. H. M. Howe was made a life member of the council and Robert W. Hunt, the member of the council for the United States. The secretary of the association is Ernst Reitler, of Vienna, Austria.

The membership of the association, now numbering nearly 3000, is insufficient to pay the expenditures of the triennial congress period, with the present annual dues of $2; the dues were accordingly raised to $4 per year.

The technical proceedings of the congress were concentrated in the first week of September. Following the real work of the congress a railway excursion, the "Official Tour," was begun on Sunday, Sept. 8, to continue throughout the week. From a technical viewpoint the visit to the Bureau of Standards laboratory in Washington, inspection of the laboratories of the Bureau of Mines and the Bureau of Standards in Pittsburgh and a demonstration by the Bureau of Mines at Pittsburgh are the chief events of the excursion week.

T. Lane Carter

Thomas Lane Carter died Sept. 2, 1912, at Polaris, Beaverhead County, Mont., from the result of injuries sustained in an accident in a mine of which he had recently assumed the management. The details of the accident have not yet been received. Mr. Carter was married to Miss Helen Hyde, of Chicago, about four months ago, and immediately thereafter went to Polaris.

His boyhood was spent at Amite City, La. He graduated from Tulane University about 16 years ago and went to South Africa where he entered the mining-engineering profession under the influence of Hamilton Smith, a relative, who had achieved great success on the Rand gold field. Mr. Carter was for six years in the employ of the Crown Deep and Robinson Central Deep mines, when compelled to leave the Boer republic at the outbreak of the war with Great Britain. After a trip to the United States, he returned to South Africa as a captain of volunteers and served during the closing months of the war. Mr. Carter assisted in an investigation of the mineral resources of Central Africa and later was appointed manager for the French Rand Mines which he made a profitable undertaking. He returned to the United States in 1907 and spent the following year in exploration work in Nicaragua. He then went to Chicago and in partnership with S. T. Osgood established the engineering firm of Osgood, Carter & Co.

Mr. Carter, who was in his 36th year, was one-time vice-president of the Chemical, Metallurgical, and Mining Society of South Africa, a member of the American Institute of Mining Engineers, and the Institution of Mining & Metallurgy. He contributed to the transactions of these societies, was South African correspondent for the ENGINEERING AND MINING JOURNAL, and the author of several books on travel in the many countries he had visited. Mr. Carter was a grandson of the late Chief Justice Hennen, and a cousin of Gen. J. B. Hood, of the Confederate Army. He is survived by his mother, widow, three brothers and four sisters.

New Cinder Nodulizing Plant

The Pyrites Co., Ltd., of London, has begun the construction of a plant at Roanoke, Va., for nodulizing pyrites, says the *American Fertilizer*, Sept. 7, 1912. The copper contents will be leached, and the daily output will be about 200 tons of nodulized pyrites. The company will collect cinder from various Southern plants. George W. Gray is manager.

Eighth Congress of Applied Chemistry

A noteworthy gathering of hundreds of chemists from all parts of the world now being held in New York. Short notes on the proceedings of the Congress, and abstracts of some of the principal metallurgical and chemical papers.

The first business sessions of the eighth International Congress of Applied Chemistry were held in the various buildings of Columbia University, on Sept 6. The gymnasium was used as registration office, and for the convenience of the hundreds of foreign scientists, information booths were installed where French, German and Italian inquiries were answered.

The congress met on Friday in 24 sections: Analytical chemistry; inorganic chemistry; metallurgy and mining; explosives; silicate industries; organic chemistry; coal-tar colors and dyestuffs; industry and chemistry of sugar; india rubber and other plastics; fuels and asphalts; fats, fatty oils, and soaps; paints, drying oils and varnishes; starch, cellulose and paper; fermentation; agricultural chemistry; hygiene; pharmaceutical chemistry and pharmacology; photochemistry; electrochemistry; physical chemistry; law and legislation affecting chemical industry; political economy and conservation of natural resources.

First Day Troubles

The programs for the congress were not issued until Friday morning, Sept. 6, which left a great deal of uncertainty in the minds of the speakers before the sections as to when their papers came. This coupled with the usual unavoidable absences caused many papers to be read by title only, for instance, in the section of mining and metallurgy, out of 28 papers scheduled for the first day, 21 were read by title only. Another first-day difficulty was the evident unpreparedness of the University Commons for the crowd that wanted lunch, and it is believed many foreign savants had to content themselves with a glass of water.

Dictagraphs Take Down Discussion

Arrangements were made by the committee to take down all the discussion, and as the number of stenographers competent to take dictation in the four official languages of the Congress (English, French, German and Italian) was limited, a dictagraph had been installed over each rostrum, and connected with two phonographs which were used alternately. Discussion was, of course, conducted from the rostrum, and not from the floor.

In addition to the formal presentation of papers before the section of metallurgy and mining, which held joint session with the American Institute of Mining Engineers, Dr. J. W. Richards, who presided, welcomed the delegates in French and English, and at the close of exercises, Doctor Heberlein, of Huntington-Heberlein fame, presented the regards of the Gesellschaft deutscher Hutten-und Bergleute, of Berlin to their engineering brethren of the world, and George C. Stone of the American Institute of Mining Engineers welcomed the delegates in behalf of that association.

Short drafts of the papers of Dwight and Hofman appear elsewhere in our columns. The complete program of the first day was:

R. Adan, Micrographie des fontes speciales de fer.
William Campbell, Some Metallographic Notes.
*Henry M. Howe, The Carbon Iron Diagram.
*J. A. Matthews, Some Physical Characteristics of High Speed Tool Steel; Bradley Stoughton, The Influence of Titanium on the Strength of Iron Castings.
*Albert Sauveur and G. A. Reinhardt, The Case-Hardening of Special Steels.
*R. H. Sweetser, Blowing-In of Blast Furnaces.
*E. B. Cook, Further Experience with the Gayley Dry Blast;
*R. B. Carnahan, Open Hearth Practice.
N. S. MacCollum, A Novelty in Open Hearth Furnace Practice.
*A. Raman, Improvements on Kilns for Briquetting Iron Ores.
*A. Weiskopf, (1) Ueber den gegenwaertigen Stand der Eisenerzbrikettirung, (2) Einflus von Eisenerz-Briketts auf den wirthschaftlichen Betrieb des Hochofens.
*F. E. Lucas, W. H. Blauvelt, C. W. Andrews and J. De Forrest, The Manufacture of Coke.
*A. Lidoff, Iron Coke.
*E. P. Matthewson, Development of the Reverberatory Furnace for Smelting Copper Ores.
*F. Laist, Chemistry of the Reduction Processes in Use at Anaconda, Montana.
*Utley Wedge, Roasting Copper Ores and Concentrates Preliminary to Leaching to Secure Copper Values.
A. S. Dwight, The Dwight and Lloyd Process of Roasting and Sintering.
H. O. Hofman and Mr. Wanjukoff, The Decomposition of Metallic Sulphates at Elevated Temperatures in a Current of Dry Air.
*W. M. Corse, Modern Manganese Bronze Tests.
*R. C. Canby, Development of the American Water Jacket Lead Blast Furnace.
*F. Cazin, The Evolution of the Modern Lead Blast Furnace.
*F. Guiterman, Silver Lead Smelting;
*E. F. Eurich, Zinc Desilverization.
*W. A. Barrows, Jr., and Carl Zapffe, Cuyuna Iron-Ore Range.
*A. S. Skinzopoulos, Un Nuovo Processo di Paniflvazione di Sterri e Sabbie di Zolfo a Ganga Priva di Calce ed Argille.
A. Eilers, Notes on Bag Filtration Plants.

The Second Day

The places of meeting and expected papers were fully understood on this day, and a much greater proportion of papers was presented at length than on the first day. The squirrels on the University campus had grown used to being addressed in four or more languages, and the University Commons came in a triumphant first over visiting appetites, although in this it was assisted by an exodus of visitors at noon, as there was one session only. There was a joint meeting of the American Institute of Mining Engineers, the American Electrochemical Society, and the sections of Electrochemistry, Mining and Metallurgy, and Political Economy, of the Congress. The papers presented were:

F. A. J. Fitz Gerald, Heat Losses in Furnaces.
C. H. von Bauer, Electric Induction and Resistance Furnaces.
P. Heroult, Recent Developments in the Metallurgy of Iron and Steel.
A. E. Greene, Electric Heating and the Removal of Phosphorus from Iron.
R. Amberg, The Function of Slag in Electric Steel Refining.
F. T. Snyder, Electric Smelting of Zinc Ore.
L. Addicks Cathode Impurities in Copper Refining.

Nothing was said of A. E. Greene's "Electric Furnaces in the Metallurgy of Steel," announced in the program, while J. O. Handy stated that his paper, "Extraction of Copper from Sulphide Ores by Roasting, Leaching and Deposition," had been formally withdrawn, and that it was given in the program in error. He gave a few details of it, however, which are presented on p. 487 of this issue of the Journal.

In the afternoon a reception was tendered the International Association for Testing Materials and the Congress of Applied Chemistry at the American Museum of Natural History, and at night the American Chemical Society entertained the Congress at the Metropolitan Museum of Art, many of the Testing Materials delegates being also present. Both were brilliant affairs, and greatly enjoyed by all attending.

The Third Day

By Monday morning the supply of badges, transactions, etc., had apparently permanently caught up with the frenzied applicants. The section of Mining and Metallurgy held a joint meeting with the sections of Inorganic Chemistry, Electrochemistry, Physical Chemistry, and the American Electrochemical Society, and as seen by the program, Mining and Metallurgy was swamped.

Binet du Jassoneix, Etude de Proprietes Magnetiques des alliages du Fer, du Cobalt, du Nickel, et du Manganese avec le Bore.
Matthew A. Hunter, Reduction of the Chlorides of Titanium, Carbon, Silicon, Beryllium and Neodymium by Metallic Sodium.
F. M. Jaeger, On Natural and Artificial Sulfo-antimonites and Sulfo-arsenites.
Marcel Oswald, Equilibres des systemes eau-azotites de sonde.
E. Weintraub, Experimental Lecture on the Element Boron; Its Compounds and Uses.
Richard Zsigmondy, Bemerkungen zur Systematik der Kolloide.
B. Kuriloff, Elektrochemie und physikalische Chemie des Uebergangs von kolloidalen zur krystallinischen Korpern.
Albert Reychler, Contribution a l'Etude des Savons.

*Read by title only.

H. Bechhold, Licht von Standpunkt der Kolloidforschung.
D. A. MacInnes, The Rate of Absorption in Catalysis by Colloidal Platinum Solutions.
Nicola Pappada, Sulla Elettrizazione de Grani Colloi (On the Electrization of Colloidal Grains).
S. Miyasawa, On the Coagulation of Colloidal Aluminum Hydroxide.

Owing to lack of time, the last seven papers were carried over until Tuesday.

Over in the section of Analytical Chemistry the zinc experts had their innings, as follows:

G. Chesneau, Analyse de l'acide vanadique commercial.
Victor Lenher and C. C. Meloche, The Influence of Lead on the Ferrocyanide Titration of Zinc.
Frank G. Breyer, A Proposed Standard Method of Analysis for Zinc.
Frank G. Breyer, A Rapid Estimation of the Amount of Cadmium Present in Zinc Ores and Products.
Eric John Ericson, A New Method of Spelter Analysis.
Ellwood B. Spear, The Electrolytic Determination of Zinc.

Tuesday's Session

On the fourth day the morning session of the section of Mining and Metallurgy was chiefly remarkable for its lack of papers. Of the nine papers called for, there was but one read in abstract, that of Richard Zsigmondy, "Bemerkungen zur Sytematik der Kolloide," which was presented by Jerome Alexander for Doctor Zsigmondy, and discussed at some length by G. Bruni, of the University of Padua, Italy, and Mr. Alexander.

The interesting fact was emphasized that Zsigmondy, who classifies all colloidal diffusions according to the size of the particles, and to the original states of the substance diffused and the medium, does not try to define the state in which the diffused substance is. That is, red glass is a colloidal diffusion of small gold particles in glass, i.e., a diffusion of small particles of a solid in a solid, but it would not of necessity follow that the diffused substance itself was solid. Again, colloidal mercury (an original liquid) acts like other colloidal metals (original solids) when in water. While the paper itself did not seem particularly interesting to the metallurgists, there is an ultimate hope of light being thrown on such problems as metal losses in slag, fume in flue gas, etc.

In the section of Inorganic Chemistry there was some amusement caused over Jerome Alexander's introduction of a resolution commending the Diamond Match Co. for its public-spirited action in giving to the public its rights to the phosphorus-sesquisulphide process. This was objected to by one member, who stated he had heard, but did not know, that the Diamond Match Co. was able to do this, because it still controlled the patent on all the machinery that would make sesquisulphide matches. Mr. Alexander stated that he did not know, but that other people could turn out matches as shown by the lively competitors of the Diamond Match Co. He said that he believed that the Diamond company did control some fine match-making machinery, but simply because they were willing to give the public the use of the sesquisulphide patents, and instruction in how to use them, was no reason for making a general distribution of stock and machinery, and advising the public as to the combination of the safe. Mr. Alexander's motion was enthusiastically carried, the chairman meanwhile facetiously explaining neither he nor Mr. Alexander were Diamond Match employees.

A lively tilt was also carried on between Messrs. Wilke, Bowen and von Rucker over the use of the contact and chamber-acid processes in tandem, which we report fully elsewhere. The dictagraphs had succumbed to an overdose of technical vocabulary, and were no longer to be seen today.

A resolution was presented for action on Thursday, to the effect that the report of the International Committee on Atomic Weights should be published only every fifth year in January. In the discussion it was urged that even though the table was not authoritatively altered except every fifth year, the publication of the changes ought to be in September, to enable the teachers of chemistry to use the same table the entire scholastic year. It was also urged that there should be some discretionary power vested in the committee, so that if a new element were discovered, or a radical error found in an old one, the change could be adopted officially immediately.

Other interesting resolutions introduced were: That the financial statements of the International Commission on the Publication of Annual Tables of Constants should be approved, its work approved, and its powers continued, and that the congress recommend financial aid be extended to the commission by governments, academies, learned societies and technical establishments. It was urged that this is a work which interests everyone who needs reliable and complete tables of constants. Resolutions were also introduced, favoring an International Commission on the Nomenclature of Iron and Steel, and moving that the official languages of future congresses be French, German and English.

The congress will close on Thursday but various social functions will fill in the time Friday and Saturday. A Pittsburgh meeting has been announced for Sept. 17 and 18. On Sept. 17, the Clairton works of the Carnegie Steel Co. will be open to the delegates and in the afternoon there will be an excursion on the Monongahela River when the various establishments on its banks may be viewed. Wednesday morning, Sept. 18, the congress will visit the laboratories of the U. S. Bureau of Mines and Bureau of Standards, as well as the Pittsburgh municipal filtration plant. A choice of two excursions will be offered Wednesday afternoon: (1) Harwick mine, of the Allegheny Coal Co. (2) A. Guckenheimer & Bros. whiskey distillery and U. S. Bonded Warehouses, and the plant of the Allegheny Plate Glass Co. Other important industrial establishments will be thrown open to small parties of visitors.

Recent Dwight - Lloyd Installations

The general features of the Dwight-Lloyd machine are well-known to the JOURNAL readers, so that no repetition is necessary. However, certain points given by A. S. Dwight before the International Congress of Applied Chemistry are new. Mr. Dwight, in speaking of the Huntington-Heberlein pots, said that these had been about five times as effective roasters as any furnace previously known. But apart from the massiveness of the cake produced and the labor for breaking it, their disadvantage was the powdery residue on top of the roasted charge. This seemed to be due to the ebullition of the top particles under the influence of the blast.

It seemed possible to avoid this fine residue by putting a screen over the surface. The next step was to make this screen support the material as well, by turning pot and blast upside down, and the result was a process about five times as efficient as the Huntington-Heberlein pots had been.

Some of the photographs shown of the new installations were highly interesting. At the Murray, Utah, plant, was shown a double row of storage bins for ores for the Dwight-Lloyd roasters; the storage bins were old up-ended Brückner roaster cylinders, superseded by the Dwight-Lloyds. In this plant the bins feed to short-belt conveyors, which in turn feed to a big belt conveyor that feeds the roaster. If the roaster is speeded up, the belt conveyors are automatically hurried to suit, reducing hand labor to a minimum.

In the Tooele plant, the blast-furnace charge is collected in a larry which weighs the ingredients as they are added, put over Dwight-Lloyd machines, and then smelted.

At a lead plant in Missouri, four Dwight-Lloyd roasters have replaced 29 Huntington-Heberlein pots, and 27 men do the work 187 formerly did. At this plant, only coke, a little limestone, and occasionally some ferruginous flux is added.

Doctor Heberlein himself was in the audience and at the close of Mr. Dwight's lecture, remarked that he could only confirm Mr. Dwight's estimate of his machines' efficiency, and that he himself had recommended their installation at several plants.

While he said it was possible to push the efficiency of the Huntington-Heberlein roasters far beyond the early practice, so that one pot would treat 40 tons per day; and while the massiveness of

the cake was partly offset by putting the pots well up in the air, so that by dropping the cakes a partial disintegration resulted, the breaking still necessary was unhealthful work with lead ores, and owing to the saving in health alone, the Dwight-Lloyd roaster justified its adoption. In copper practice, Doctor Heberlein said the use of a water spray on the cakes, following by dropping them, as above mentioned, completely disintegrated them, while in lead roasting there were strings of metallic lead through the mass, which effectively bound it together.

He also made some interesting comments on the high SO_2 content obtained in some Huntington-Heberlein installations. For instance, at Friedrichshütte, 60 to 70% of the evolved gases were used for sulphuric-acid making in the lead-chamber process, while at the Rhine Nassau Works in Stolberg, the Dwight-Lloyd process is used, and gases with about 4.5% of SO_2 transformed into monohydrate acid by the Grillo contact process.

A Combination Contact and Tower Acid Process

Under the title "Combination of the Contact Process with the Ordinary Lead Chamber or Tower Systems," William Wilke stated before the Congress of Applied Chemistry that he had had for consideration at one time whether some clients of his who were operating under the patents of the Verein Chemischer Fabriken in Mannheim for the production of strong acids, could profitably reduce the highly concentrated acids to lower strengths.

They had decided they could not, and in order to fill the demand for chamber acids, had combined the chamber and contact processes. In order to be independent of the variations of the pyrites market both coarse and fines burners had been installed, the final daily capacity being 24,000 lb. of fines and 36,000 lb. of lump ore.

The flue from the fines burners was provided with baffles and the gases, after passing this, united with the lump-burner gases, and were conducted through an iron-oxide contact shaft. An exhaust fan was placed on the fines flue, to regulate the draft on the fines burners, and a second fan was placed between the contact shaft and the Glover tower. About 30% of the SO_2 underwent conversion in the contact shaft.

As a result of the combination of the two distinct processes: (1) The capacity of the chamber plant was increased 30%; (2) about 30% of the SO_2 was converted in the contact tower; (3) the acid in the Glover tower was water white; (4) 95% of the arsenic in the gases was eliminated in the contact tower; (5) the entire chamber production of acid can be concentrated to 60° Bé. or higher. Further, the iron-oxide shaft is the best known means of keeping dust out of a chamber system, it is an accumulator and equalizer of heat and saves 30% of the niter usually required. These satisfactory results were all attributable to the introduction of the contact shaft between the burners and the Glover.

Mr. Bowen Objects

Mr. Bowen, of the Contact Process Co., endeavored to find out whether this paper did or did not refer to its Buffalo plant, but Mr. Wilke would only say that he had designed its plant first and had since designed six or seven others. Mr. Bowen said that he concluded that Mr. Wilke's description referred to the Buffalo plant. In that case he wished to say that eight or nine years ago a plant had been built at Buffalo to work on the Mannheim system (iron-oxide contact). That later a plant was built in which the iron-oxide plant is followed by the chamber process. That it could not be described as satisfactory, it never had been, and was torn out, and rebuilt after Doctor von Rucker's designs. Even now, although it worked fairly well, it was not nearly so good as the straight contact plant.

The average conversion was not 30%, it was sometimes *nil,* sometimes as high as 50%, but would not average 30%. The plant did not eliminate 95% of the arsenic, their figure was 80 to 85%. He also questioned Mr. Wilke's statement as to the type of fines burners originally installed (Mr. Wilke stated they were Herreshoff's) as the burners were the O'Brien type. A question was asked at this point, whether warm or cold weather made any difference in the conversion. Mr. Wilke said none whatever. Doctor von Rucker, of the Contact company, interrupted and stated that the conversion was much greater in winter.

After another paper had been read Mr. Wilke requested permission again to take the floor, and stated that the plant he illustrated was not the Contact Process Co.'s Buffalo plant, and that he had not gone particularly into the burner question as the burner type was immaterial. Mr. Bowen stated that he had vainly attempted to get Mr. Wilke at the outset to say whether or not he was describing the Buffalo plant. Although he could see that the illustration was not the Buffalo plant, one would reasonably infer from the statement "since constructing the above described plant, the contact shaft has been introduced into other chamber plants with good results," that the above described plant was the first, the Buffalo plant. At this point the Chairman stated that as the discussion was verging on the personal, and had nothing to do with the scientific side of the case, he was forced to close it.

Extraction of Copper by Roasting and Leaching

In an informal talk before the International Congress of Applied Chemistry, J. O. Handy told of some results attained by him in the extraction of copper by roasting and leaching. The ore consisted of chalcocite, copper pyrite, and a little iron pyrites, with an aplite and porphyry gangue. The ore was crushed to from 20 to 40 mesh, and roasted at 500° to 550° C., which completely converted the copper to sulphate. It was found unnecessary to grind below 40 mesh.

The copper was then leached out with water, and was to be precipitated by electrolysis. Carbon anodes were found to disintegrate rapidly in the copper-sulphate solutions, and lead anodes were used. These were found to peroxidize less rapidly when covered with some sort of fabric. Apart from the corrosion of the lead, the peroxide is disadvantageous as it raises the voltage. A way to get rid of it temporarily was to shoot up the current rapidly and crack off the peroxide.

He found that the figures given in the text books for deposition seemed rather too high, and that he obtained 23 lb. per horsepower-day. The original idea was to use the spent electrolyte for leaching, in order to get out any oxides of copper with the sulphate, but he found an obstacle in the sulphatization of the alumina and potash in the ores, which leached out with the copper, and when the solution cooled during deposition, deposited as crystals of alum on the electrodes and in the tanks. It might have been possible to separate the alum as a commercial product, but the alumina was in excess of the potash, and addition of potassium salts would have been necessary.

Carl Hering, in the discussion, said he had obtained some interesting results in depositing zinc from sulphate solutions, using a porous lead anode. The zinc was deposited on the cathode, the SO_4 formed $PbSO_4$ in the porous anode and deposition went on practically down to clear water.

[It is our experience that agitation of the anodes, preventing polarization to a great extent, inhibits the disintegration of carbon anodes, while the trouble with aluminum and potassium salts foreshadows what seems to be the great trouble with all leaching processes when operating on a commercial basis, that is, contamination of and consequent necessity for regeneration of the electrolyte. It is to be hoped that the results of the experiments of the Braden Copper Co. and of the various Arizona companies on leaching will some day be made public, as they will probably greatly clarify this problem.—Editor.]

Electrolytic Determination of Zinc

In a paper before the International Congress of Applied Chemistry, Ellwood B. Spear discussed the inaccuracies of the electrolytic zinc determination and how they may be avoided. The zinc must be present as sulphate; and strong hydroxide solution should be added (10 to 20% solution).

The analysis is made with a rotating cathode and the cathode must be lower than the anode, otherwise the oxygen rising from the anode oxidizes the deposited zinc. The amount of the zinc in solution should be roughly known, so that the time of deposition may be calculated. Electrolysis is started in boiling hot solution, and about four to six minutes before the end of deposition the solution is cooled with ice water. The best results are obtained when the top edge of the gauze cathode is bent over to form a three-quarter hollow sphere.

When the cathode is removed, it should immediately be washed in water, alcohol, then ether, and dried by artificial heat. This last is important. If the ether be allowed to evaporate spontaneously, it cools the cathode and deposit until a film of water forms which hydrolyzes the deposit, and the results will be high.

As a matter of fact, a little of the zinc dissolves when the cathode is taken out, and a little is oxidized in washing and the two errors just balance. One should not attempt to displace the electrolyte with water, or to siphon down the electrolyte, otherwise the errors will not balance.

A High Critical Point in Steel

In the course of a paper before the International Congress of Applied Chemistry, C. H. von Bauer spoke of finding a high critical temperature for steel. As is well known, when steel is heated by a uniform source of heat, at 760° C. the temperature ceases to go up as rapidly as before, and continues to advance slowly until 810°, after which it again goes up at the former uniform rate.

A second such point was found at about 2350° to 2550° C. Below 2350° the steel was very liquid, but grew pasty on being heated more, in which condition it continued until it reached about 2550° C. after which it became fluid again. On cooling, the reverse changes took place. At 2550° C. the steel became pasty and could not be poured. A bar of cold steel was then put in the ladle which cooled it down so that it again became fluid and could be poured. The steel used was blown basic bessemer, not recarburized, and carried about 0.08% C. The temperatures were taken with a radiation pyrometer.

In this connection Mr. von Bauer spoke of the temperature range in the induction-furnace work, which is practically limited only by the fusion point of the lining. For instance, he had attained temperatures in an eight-ton steel furnace, using the current usually required for a 15-ton furnace, which had fused a magnesia lining.

The Genesis of the Steel Eating Worm

The ancient Munchausen tale concerning "the worm that eats steel rails," which has for a quarter of a century been revived at intervals, is again abroad in the land. To learn where this particular story originated, *Engineering News* requested E. G. Spilsbury, past-president of the American Institute of Mining Engineers, who was not only present at the birth of the story, but appears to have been a sort of associate midwife, to reveal to the world the true record concerning this marvellous tale. Mr. Spilsbury wrote as follows:

Sir—Your request for an account of the discovery of the "Steel Worm" takes me back to the little manufacturing village of Haspe in Westphalia, in the year 1866. Just about that time the introduction of bessemer steel rails had begun on a commercial scale, and the press—both lay and technical—was full of discussions for and against the new product.

The professional employees of the different iron, steel and chemical works of the surrounding country used to meet every Thursday evening in the "Weinstube" of the local hotel and discuss all questions that were then of general interest. Any visitors were also made welcome.

Under the stimulus of good fellowship, and possibly good wine, all sorts of theories—scientific and otherwise—were evolved, and the outcome of these meetings was the founding of the Society of "Ulk," which soon became known all over Germany as the source for practical jokes. The title "Ulk," an old and nearly obsolete German word, means "fun," and for our motto we used the three letters U L K as the initials for the words, Unsinn, folly; Leichtsinn, frivolity; Kneipsinn, conviviality; and we never belied either one of them.

It was then at one of these Thursday evening meetings that the "steel worm" was born. An inquisitive editor from one of the nieghboring towns was the subject of the joke, which was propounded in confidence to him as a scientific discovery of great value. It was supposed to be kept a secret until further investigation should prove the correctness of the theory.

By the following Thursday, the animal itself was produced, being a gruesome-looking thing, nearly all head, made out of gutta percha burette tubing. It was exhibited in a bottle half filled with roll scale, and the worm itself, having been filled with dilute hydrochloric acid, would, when properly stirred with a glass rod, emit a drop, which at once attacked the flakes of the roll scale and proved the theory that corrosion of the rails was due to an acid secretion and that the resulting oxides were the food of the worm.

The newspaper man swallowed the whole story and proceeded to publish it, quoting the names of quite a number of well-known iron and steel men as sponsors. The press all over Germany took the matter up and very funny discussions resulted among their different correspondents. Some of the most amusing were the denials of the authorities quoted in the first published account that they had ever noted or studied this question of rapidity of corrosion of bessemer steel rails, over those made from iron. Of course, the matter was too ridiculous to be kept up as a serious discussion for very long, but the story has never died, and every year or so crops up as a new and wonderful discovery.

While the carrying out of the details of the story was the result of the combined efforts of our society or club, the first conception of it was evolved from the brains of a young man whose name I forget, but who was, I think, a chemist at the Hoerde Iron Works in Bochum.

Quite a number of other discoveries and inventions emanated from that little coterie of bright intellects, but none of them has equaled the vitality or longevity of the "steel worm."

E. Gybbon Spilsbury.
New York, N. Y.

*Reprinted from "The Engineering News, Aug. 29, 1912

A Memorial to Lord Kelvin

Members of all the British technical and engineering societies are engaged in raising by subscription a fund to place a memorial window in Westminister Abbey in honor of the late Lord Kelvin—perhaps better known as Sir William Thomson—the distinguished electrician and inventor. A general committee has been formed, with Dr. William Cawthorne Unwin as chairman, to take charge of the work of securing the funds and erecting the memorial. This committee includes representatives of the American Institute of Mining Engineers and the other prominent engineering societies of the United States.

Influence of Lead on Ferrocyanide Titration

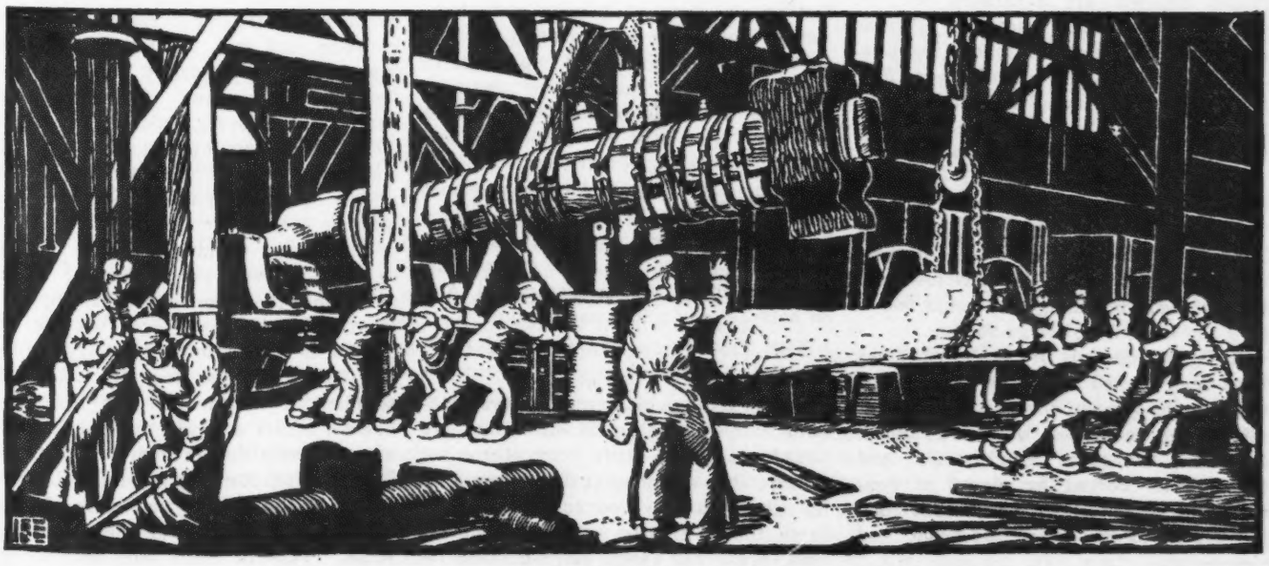
Victor Lenher and C. C. Meloche stated before the International Congress of Applied Chemistry that they had investigated the literature of the ferrocyanide titration of zinc to see what was said concerning the influence of lead, and had found practically nothing written. They had investigated the matter, adding lead chloride to the point where 200 cc. of solution refused to dissolve any more, and had found it without effect.

Krupp Centenary

In connection with the Krupp Centenary, (cf. ENG. AND MIN. JOURN., Aug. 31, 1912, p. 394), we reproduce some illustrations from the August number of *Stahl und Eisen,* showing the steel foundry in 1835, the hammer of 1835, and the steam hammer of 1852. The engine shown in the back-ground of the 1835 hammer is the first steam engine

THE KRUPP FOUNDRY IN 1835

THE TRIP HAMMER IN 1835



THE STEAM HAMMER OF 1852

used by the Krupps; the hammer head weighs 800 kg. The gentlemanly puddlers and smiths seem to be attired in the formal afternoon clothes of the period. The steam hammer of 1852, it will be noted, is driven directly by a piston and cylinder.

Approaching the Limit of Increasing Gold Production

From the present outlook in the gold-mining industry of the world, gold production will have reached its maximum within the next 12 months, and it is possible that 1912 will show a positive decrease, says H. C. Hoover, in a recent article in the New York *Sun*.[1] Continuing with a review of the various countries in respect to their future gold production, Mr. Hoover said:

The placer gold of Europe was practically exhausted in Roman times. Lode mining there is a small industry and every foot of ground is known. In Asia the Chinaman has washed the gravels from Siam to Tibet and Mongolia centuries ago. In lode mining I can say from three years of exploration there that he has long since exhausted the mines down to water level and if mines do exist it will be a very slow business finding them.

No Great Expectations from Central Asia

I do not myself believe there exists in China or Central Asia a district of such importance as to materially affect the question, for no greater illusion exists than that the Chinaman has any prejudice against mining for gold—when he can make a profit. And he can make lode mines profitable by hand labor on which we could not earn a cent with the finest machinery ever built.

In India mining has been going on for thousands of years. The placer deposits are exhausted and in the only lode-mining district of importance we discovered the mines are now 3500 ft. deep and are becoming very difficult to operate. India has been decreasing its output for the last six years, and it will inevitably continue to do so.

In Asia Minor the alluvial gold has been exhausted since Crœsus' time. There may be some lode mining, but it is a striking fact that none of the districts that were worked by the ancients—and they worked everything they could find—give any evidence of large volume.

In Egypt hundreds of ancient workings have been opened up during the last few years to the grief of the operator. In fact all mines in these old civilizations, Egyptian, Chinese, Central Asia and India, were worked by slaves or convicts who were fed with impressed food so that all of the metal was profit, and thus hundreds of deposits were worked which prove of no use to the modern operator with all his appliances. And it is scarcely probable that the ancients deliberately chose the worst deposits.

In Australasia, the placer industry is in its dotage. The lode districts within the periphery of say 300 miles from the coast line, are in their decadence, the great interior desert is partially unknown but has in recent years been much traversed. The districts in the interior so far discovered, such as Coolgardie, Kalgoorlie, etc., are all decadent. The maximum output from Australasia was reached about five or six years ago, and it has been steadily decreasing ever since.

U. S. Dredge Production Has Passed Its Zenith

Placer mining in the United States made a recovery from apparent extinction a few years ago by the rise of the dredging industry; this has passed its zenith and the output will soon begin to decrease if it has not already done so. Lode mining has had no accessions since the Nevada discoveries of ten years ago. Altogether the outlook is decidedly toward diminution of the output, for lack of sufficient new recruits to fill the places of those producers now imminent of death.

Canada poured a vast quantity of gold out of the Klondike hand-worked placers, but that stream has become but a trickle from the giant dredges now being built to work over the leavings of the early pioneers. Elsewhere, even with Porcupine thrown in, that country cannot, from anything in sight, maintain its average of ten years ago, although the unknown territory in that country is nascently more pregnant of new mines than the now well prospected countries further south.

Siberia has been vaunted as the future gold source of the world, and gold is wonderfully distributed over that country. But so are dismantled mills and abandoned dredges—a confirmation of the opinion of all engineers of experience in that region, that but little of the area promises profitable mining. Some hope does, however, exist for successful new dredging areas in the extreme Northeast.

South and Central American placer gold was practically all seized by the Spaniards. The lode mining has had English capital poured into it for generations. One company is over a century old. And on balance only a loss has resulted.

The Rand Will Not Increase Its Output

On the Rand, which produces over one-third of the world's gold, the mines are already becoming fairly deep (there are considerable workings at more than 3500 ft.), the ores are becoming poorer with depth, the profit to be won from the shallower areas was vastly overestimated, labor and physical conditions are steadily becoming more difficult, working costs are rising and grade of ore falling. This district will certainly not materially increase its output, and I should not be surprised to see an appreciable decrease within 12 months. It will go on producing gold for fifty years, but in steadily diminishing quantity and even 10 years will see a great decrease.

Outside of the Transvaal, there are two large areas known in Africa, that is Rhodesia and West Africa. The gold deposits of Rhodesia are mostly the erratic quartz type, and *en bloc* cannot be expected to return the money invested. The British public has invested this money under the glamour of the Rand, and will not repeat very often the game of spending $20 of labor and material to get $10 in gold.

West Africa has been vastly overestimated, and the tombstones of English companies who have been operating there are now being set up by the score. There are some unexplored places on that continent but they are much less than is currently believed by those unfamiliar with the vast amount of prospecting that has been in progress during the last 15 years. Large areas of the Congo Free State, Uganda, Nyassaland, Nigeria, Sudan, Sahara, etc., have been demonstrated to be geologically unfavorable, and the probability of any gold industry is of the remotest kind in these territories.

Opportunities for Improved Methods Not Important

It is not my point that no new mines will be discovered; it is that great districts are unlikely and that the annual supply of new isolated mines will not replace the frail and dying members. The great opportunities for the application of newly discovered methods have all been taken advantage of; no industry has had such a generous supply of capital for every warrantable enterprise. Further the opportunities for improvement on modern methods, and thus the renewed play of lower-grade or refractory mines, are no longer of importance. The increase in percentage recovery from 60% to over 90% offered many opportunities and realized much increase in production, but the region for expansion between 92% and ultimate 95% is small.

The cost of working has been reduced to near bedrock by mechanical equipment, until the room for further improvement amounts to cents per ton and not dollars as it was formerly. And in this last connection the cost of wages and supplies in this industry is increasing like all others and will more than offset any reduction due to improved methods. The working costs on the Rand, in Australia, in Russia and elsewhere show a considerable rise during the last two years. This in itself will tend to diminish the output.

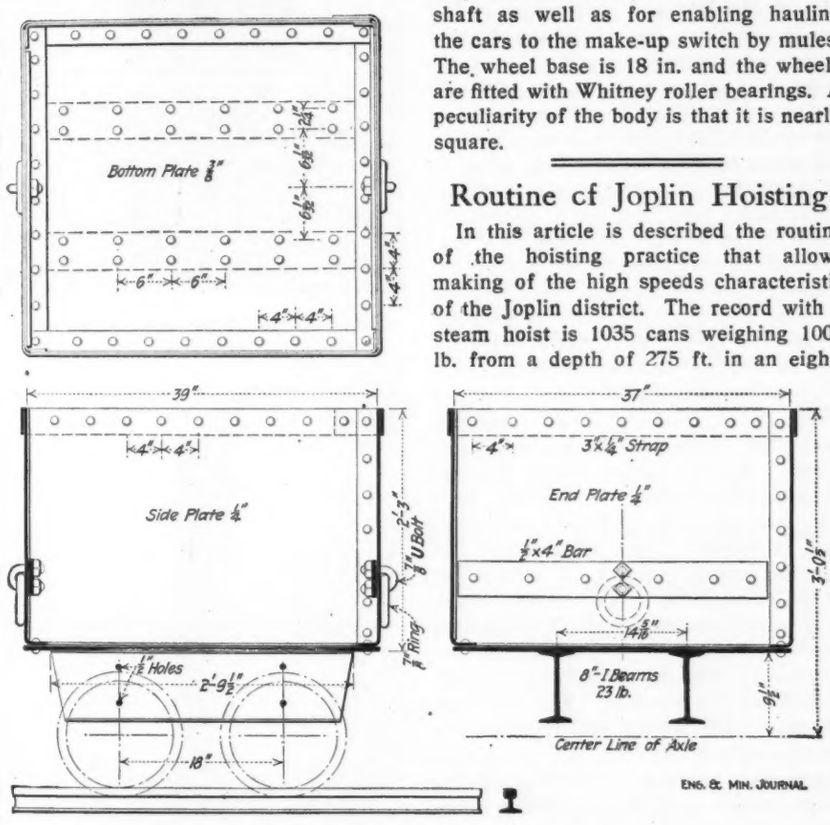
[1] "Are We Near the Gold Output Limit?" by H. C. Hoover, "The Sun," Sept. 8, 1912.

Details of Practical Mining

Accounts of Useful Ways of Doing Many Things in the Day's Work

Doe Run Mine Car

The car used in the mines of the Doe Run Lead Co., in southeastern Missouri is of the type in which the dumping must be done by a tipple. Where most of the ore is mined on one level and there is little need of dumping waste from development work into stopes in order to fill them as is so often the case in mining the weaker-walled deposits of the West, this is not much of a drawback, for whenever the ore does have to be dumped to a lower level for tramming it to the shaft a tipple can cheaply be put in to do the dumping. Such cars in which the body and wheels are tied tightly together are much cheaper to keep in repair than are those pivoted to a wheel truck so as to allow dumping at any place. Moreover, they are cheaper in first cost.



CAR USED IN THE DOE RUN MINES

In order to permit placing the wheels under the body they are fastened by their axles to two 8-in., 23-lb. T-beams that are riveted tightly to the bottom of the body which is a ⅜-in. plate. The sides which are ¼-in. plate are riveted to this bottom plate without any reinforcement at the lap. The top of the car is reinforced by a 3x¼-in. strap, while a 4x½-in. piece is put on the inside of the car to reinforce it and to distribute the strains that come from the draw-rings over a larger area of the end plates. There is a draw-ring at each end of the car for fastening them in trains when they are hauled by locomotive to the shaft as well as for enabling hauling the cars to the make-up switch by mules. The wheel base is 18 in. and the wheels are fitted with Whitney roller bearings. A peculiarity of the body is that it is nearly square.

Routine of Joplin Hoisting

In this article is described the routine of the hoisting practice that allows making of the high speeds characteristic of the Joplin district. The record with a steam hoist is 1035 cans weighing 1000 lb. from a depth of 275 ft. in an eight-hour shift. This is an average of a round trip in 28 sec., hour in and hour out. It was made with a first-motion steam hoist. At the Diplomat mine at Galena, Kan., where nine-hour shift is worked the record for one of the electric hoists is 1031 buckets from a depth of 200 ft. in one shift, while in one week of 6 days 5847, 30x30-in. buckets have been hoisted.

Where hoisting is done at high speeds there is always employed what is called a "pig-tail" whose duty is to run the buckets up to the hooker who stands at the bottom of the shaft and to take off the bucket and put another on. Generally a center pull is used. In this system the bucket is run in on the truck directly under the sheave so that the bucket does not have to be steadied before the trip begins as is the case when a side pull is used. As the bucket comes down, the tub hooker swings it aside and lands it on a small side plat on which he is standing and which is about 15 in. above the ground so that after the loaded bucket is off the bucket car the hooker can easily shove the empty bucket on the car. Upon lowering the bucket in the center-pull system the hoistman lets out just enough slack so that the hook when removed from the empty will easily but tightly hook into the bail of the loaded bucket. Then the bucket is ready for hoisting as soon as the signal is given without any necessity of steadying the bucket to stop side swinging, but generally the bucket is slacked up an instant when about the height of a man's head and the bucket hooker steadies it in case there is any side swing due to the bucket car being placed a little out from its correct position. This steadying of the bucket is necessary because in Joplin hoisting no crosshead is used.

In the system of hoisting with a side pull, which is also used in the Joplin mines, the empty bucket is landed on a platform under the center of the shaft while the loaded bucket is on the car butting up against this plat, but out of plumb with respect to the sheave of the hoisting rope. In this system of hoisting the hoistman, when he lowers the bucket lets enough slack out so that the hook may be just swung over and fastened to the bail of the loaded bucket. Then the hooker gives the signal, the hoistman raises the bucket about a foot higher than the empty bucket, the hooker steadies it so that there is no side swing, then the hoistman takes the bucket away. Owing to the fact that the bucket has to be steadied by the hooker with the empty bucket directly underneath there is danger with this system of the hooker getting his hand mashed between the two buckets through slipping of the brake. The system is slower than the other and more dangerous. In the side-pull system the empty bucket just as in the other case has to be worked over on to the bucket car. In both systems where the buckets are being run to the shaft from two directions the empty bucket is landed on an extra truck and the lifting of the bucket is avoided. Still this lifting does not take much exertion as the hookers develop a marvelous dexterity

just as cagers do in the handling of cars both on the turnsheets and in dropping them on to the cage when the hoistman has lowered the deck a little too far.

The hoistman not only has to tend to the hoist operating at a speed of 100 ft. per sec., but also has to throw a door over the shaft well, hook the tail rope into the ring in the bottom of the bucket, dump the bucket, swing the door out of the way of the bucket, hoist back the bucket from its dumping position, unhook the tail rope and lower the bucket again. Fortunately there is a regular routine to the work which has been worked out with a surprising simplicity.

In the first place the geared or direct-connected steam, or electric hoist is placed so that the hoistman stands at the side of the well in the floor of the derrick through which the bucket passes. Around this well is a boxing with a slope to the top sides of about 45°, upon which rests the door for covering the well, while the bucket is being dumped. This door rests back against stops when not in position over the well, and from the top there generally extends an iron pin for a handle on which the hook of the tail rope for dumping the bucket hangs so that the hoistman can grab it with three fingers while with the other two he swings the door across the shaft. This he does with his left hand. To enable him to grasp the hook easily, the hook is made with a handle.

The steam hoists are made with vertical cylinders so that there is no side shaking of the derrick. The drum is loosely mounted on the shaft and is connected to the engine by a friction clutch, which in the case of the electric and first-motion hoists is a friction band while in the case of the geared hoists connection is made through a friction cone that is thrown in and out by a screw feed. There are three levers to control the hoist. One is the throttle that the hoistman operates with his left hand and which is always in front of him. After a certain point has been reached the hoistman closes the throttle enough so that there is just sufficient steam going to the cylinders to raise the empty bucket back from the dump position at the end of the hoist. The momentum brings the bucket through the upper part of the shaft. This frees his left hand early enough so that he can have his hook and door ready by the time that the bucket is out of the well. The friction lever is grasped with the right hand while the brake band which is fitted with a hand lever and a foot lever is generally operated by the foot. A stud on the bed plate of the hoist keeps the friction lever from flying back too far to be grasped easily with the hand, but generally when the bucket reaches the top, the hoistman hangs his right knee over the friction lever and controls the friction that way while he has his right hand free to operate the throttle if he has to give a little more steam to the cylinders to get the bucket back from the dump. As soon as the door is across the well and the hook is in position, the hoistman slacks off on the friction and lets the bucket settle back and dump its load over the grizzly bars where the screen men sort out the boulders of flint.

The hoistman then throws in the friction; raises the bucket back over the well, unhooks the tail rope, swings back the door hanging the hook on the handle as he does this, lowers the bucket, having thrown out the friction clutch and put on the band brake to control the speed of lowering. About the time that the bucket reaches the bottom of the shaft the hoistman throws on full steam and is ready to pick up the load with the engines at full speed when he throws in the friction clutch on getting the signal.

By opening the ports of the engine to the air and varying rate of the escape of the air from the cylinders so as to cushion the steam piston and cause it to act as an auxiliary brake to help out the friction brake which might get out of control for some reason or other, men can be slowly lowered. Where fast hoisting is done, the engines of the hoister are never stopped. A three-way auxiliary valve is provided on the first motion hoist that in one position cuts off all the steam from the cylinder; in another position full head of steam is on, while of course between these two there are intermediate pressures. In the third main position of the valve steam is cut off from the main passage through the valve and a small quantity, sufficient to run the engine and lift the bucket out of the dump position, is admitted through a by-pass to the cylinders. The engineer sets this valve with respect to this last position so that just enough steam is admitted for that purpose. With this type of valve there is only one stroke of the throttle valve either from full steam or to the by-pass position in ordinary hoisting which results in a higher hoisting speed being attained. It is this last type of hoist, called the Freeman first-motion which is being extensively used in the newer installations. Indeed, it was the introduction of this hoist that resulted in the speeding up of the hoisting operations as when the first-motion men began to speed up their movements, the geared-hoist men also did so with a considerable increase in the speed of their hoisting.

At the Leonard mine in the Chisholm district in Minnesota recently a steam shovel loaded 8100 tons of iron ore on 180 cars in one shift of 10 hours. This, it is claimed, is a record performance on the Mesabi range. The mine is leased by the Steel Corporation from the Hill trustees.

Raising a Stack while in Operation

By Thomas J. Jones*

It recently became necessary to increase the height of the main stack at the Karabash smeltery without in any way interfering with current operations. The stack was built of sheet steel 5/8 in. thick, for the bottom rings, and diminishing in thickness to 1/4 in. at the top. It

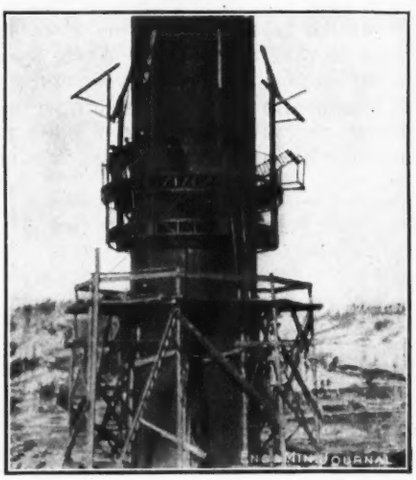


Fig. 1. Climbing and Working Platform

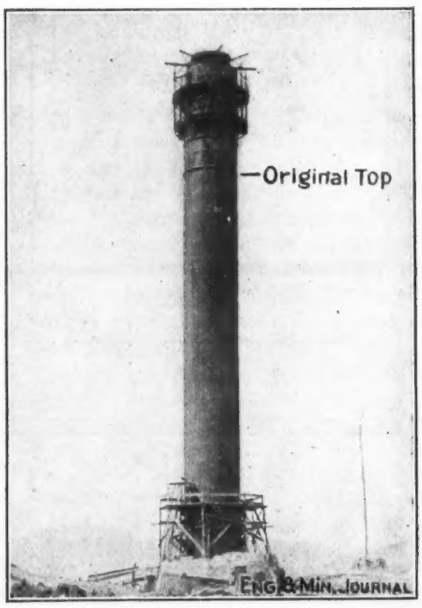


Fig. 2. Stack with 45 ft. Added Height

was 8 ft. outside diameter and lined with 9 in. of brick. The height was 125 ft. from the top of the foundation, which is 50 ft. above the feed floor. An additional height of 75 ft. has been gained in the following manner:

A mechanical device for climbing and working around the stack was built on a staging 20 ft. above the base. A close

*Manager, copper department, Kyshtim Corporation, Perm, Russia.

view of this is shown in Fig. 1, and the drawings, Fig. 3, illustrate the details of its construction. It consists of two rings provided with wooden friction blocks and wedges, which enables them to grip the stack from all sides. The lower ring was provided with stanchions to the top of which small chain blocks were attached; thus it may be seen that the two rings were alternately hoisted and wedged firmly at intervals of approximately 12 ft. until the top of the stack is reached. Platform galleries inclosed with wire netting were attached to each ring as a working place for the men. The men and material were hoisted and lowered by means of a counterpoised boatswain's chair and a hand winch. When the top of the stack had been reached, it became necessary to put in place a false length of stack, which would protect the riveters from the smoke and heat. This was put on in sections by means of swinging gantrys attached to the stanchions as shown. The gantry arms remained attached so that as the work advanced, this false section maintained the same relative position to the advancing rings.

The only difficulty encountered was with the heat, which charred the friction blocks and made it difficult for the men who had to stand between the false section and the new rings holding the rivets. The former was overcome by interposing some thicknesses of asbestos and the latter by using some sheets of camel's hair felt. Credit is due to Messrs. Koliasnikoff and Richter, smeltery manager and master mechanic, who worked out the various details of this successful and economical method.

Greasing Mine Car Wheels

The efficiency of grease over oil is so marked in mine-car wheels, particularly in the roller-bearing types, that there is a marked loss of economy where oil is used, says Benedict Shubert in *Coal Age*, Aug. 31, 1912. The difficulty of thoroughly greasing the wheels, however, has prevented the introduction of grease to as large an extent as is really warranted.

A simple greasing device consists of a drum containing about half a barrel of grease, the drum being fitted with a piston which is actuated by either air or steam pressure on one side. This drum is set permanently and two connections are taken from the drum, one to each side of the car track. The cars are run into position and the grease is quickly and thoroughly forced into the bearings, the delay being no greater than if oil were used.

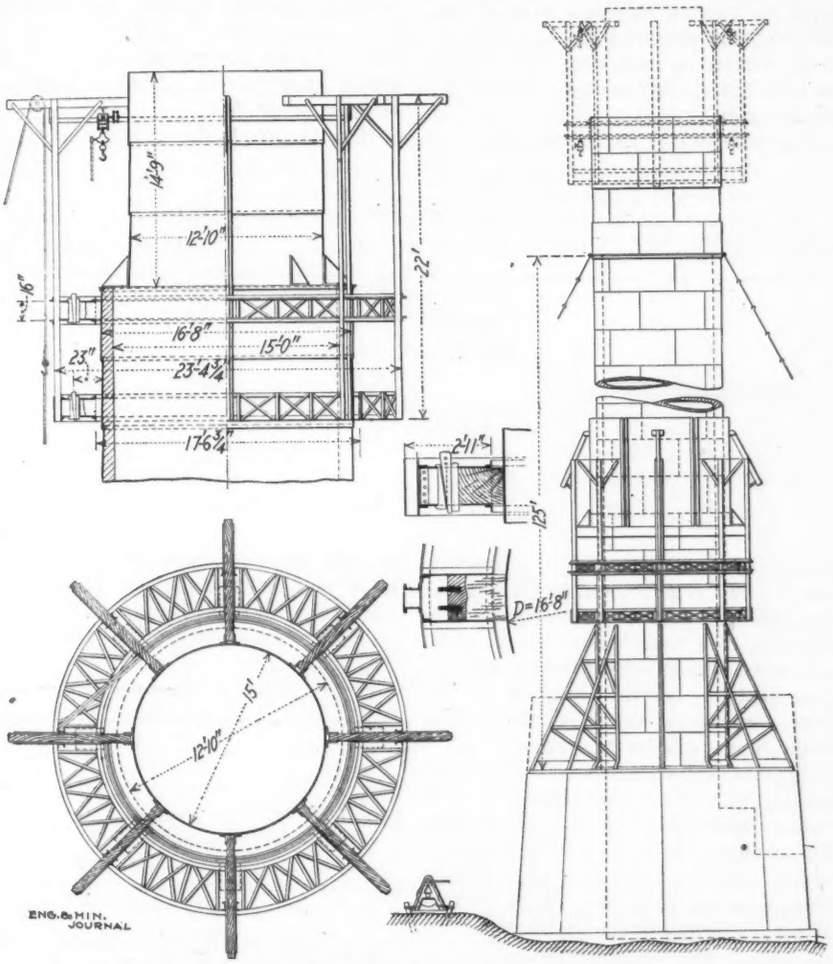
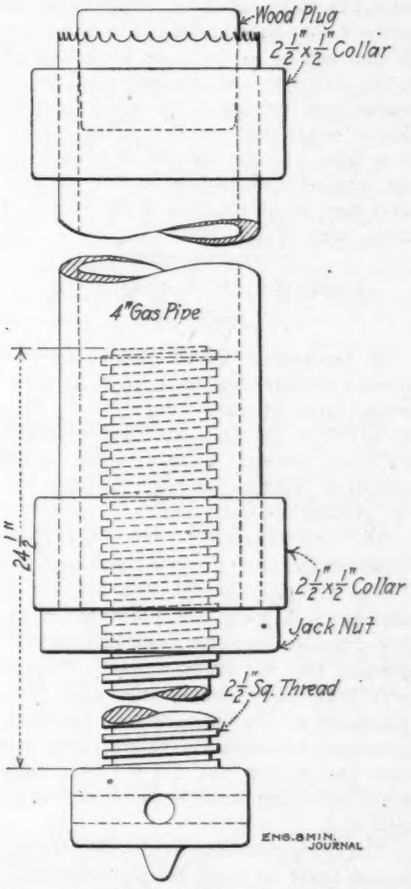


FIG. 3. DETAILS OF CLIMBING AND WORKING PLATFORM

Simple Machine Bar

In the accompanying drawing is shown the design of machine bar used in the mines of the lead district of southeastern Missouri. It is a one-screw post without any header casting at either end. The teeth for gripping the top blocking are made by cutting the pipe used for the column in two by drilling it full of holes. The pipe is then plugged with a piece of oak to keep grit from getting down into the thread of the jack-ing screw. A collar of 2½x½-in. iron is shrunk on the upper end to reinforce it after the plug has been hammered in. A similar collar is also shrunk on the bottom after the jack screw has been put in. The details of the jack-screw casting are shown in the accompanying sketch. There is no shoe on the bottom end of the jacking screw. It simply ends in a blunt point. Formerly this was stuck in the axle hole of a car wheel in making a set-up, but the ends often penetrated too far into the wheel and as the side strain was strong on the jacking



MACHINE BAR USED IN SOUTHEASTERN MISSOURI

screw the result was that several screws would be broken in the course of a month. On that account simple plates about 6 or 8 in. wide and 1 in. thick, with a depression in the center for taking the end of the jack screw are now provided. These do not let the jack screw enter far enough to put any side strain on the screw so that there is no more breaking of the jacking screw.

With this shoe plate it is possible to set up without any trouble on a steeply slanting bottom. If there was a shoe to the jack screw, a considerable side strain would be thrown on the screw unless a block was put under it to level up with such a sloping bottom so that the column could be stood perpendicular to the foot blocking. In other words, more care has to be taken in making a set-up when a foot shoe is used than when one is not, and so as the work of setting up with this type of shoeless column is easier and quicker, the machine men like it better than the bar of the regulation type. As the column is always set up on solid rock in this district, the fact that the end of the jack screw is not of large area is not important.

Emergency Repairs on Dredges

In discussing broken shafts, etc., on certain Government dredges, S. E. Lawrence calls attention (*Eng. News.*, Aug. 8, 1912) to the field for thermit repairs on these vessels. Such a repair on the pipe-line suction dredge "Captain C. W. Howell" is described.

The crankshaft of its 12x22x14-in. compound engine, directly connected to a 12-in. dredging pump, was 5½ in. in diameter. A crack was discovered in the low-pressure crankpin, and investigation showed that the crack ran into the web and back again around the pin. This precluded all the ordinary schemes of replacing the broken pin by shrinking in a new one, as the web did not have sufficient remaining metal to make such a repair safe.

The dredge was operated until arrangements could be made for a thermit weld, and on the repair day the shaft was removed to a shop. It was found to be entirely broken off. Part of the pin was machined off, leaving about an inch of space between the web and pin when the parts were aligned and fastened to a bedplate.

The mold was prepared in the usual way, and the ends to be united heated to as high a temperature as was safe. There was no hitch in the pouring of the crucible and, after cooling over night, the mold was removed in sections to prevent uneven contraction.

When the gates were removed and the complete shaft placed in a lathe the nice allowance for shrinkage, etc., was evidenced by the fact that scarcely any refinishing was necessary on the thrust collars of the shaft. The pin was turned up and the surplus metal removed and web reshaped to original dimensions without changing the balance of the shaft.

A total of four days was lost by the plant because of this repair, most of the delay being due to the distance of the dredge from the shop. This shaft continued in constant use without any evidence of the repair until the dredge was lost a year after on the Texas coast.

An idea of the saving effected in this instance may be obtained from the fact that a new shaft ordered rushed at once from the factory at a cost of $465 was not ready for shipment 90 days after receipt of order, as compared with a charge of $150 and a delay of four days for the thermit weld.

The necessity of skilled handling and placing of parts to be welded can not be too forcibly emphasized, as the chances for ruining a part are greater from mishandling than from failure of the weld, and much unnecessary finishing work is prevented by careful attention to the mold conforming exactly to the desired shape of the part to be repaired.

The hard-driven machinery of dredging plants, with their interdependent individual machines, offers an excellent field for economic employment of this method, and it will very likely play an important part in cutting down long delays brought about by extraordinary accidents.

Wear on the Trolley Wheels

One of the parts of an electric locomotive which wears the most is the trolley wheel. (*Electrical Review*, Aug. 16, 1912.) In one case it was noticed that a new trolley wheel fitted to a trolley head was worn out very rapidly and upon examination it was discovered that this was due to the fact that there was too much tension on the trolley. Some time previously the trolley standard had been overhauled and the tension on the springs set by guess work. Trolley tension for center running should not exceed 20 lb., while 25 lb. is sufficient for side running. The tension should be set with a spring balance tied to the trolley rope, care being taken to keep the trolley head at the normal height of the overhead wire. It will then be found to follow the usual inequalities of the line with pressure sufficient for good operation.

Steel Mine Ties

The steel track-tie shown in Fig. 1, and recently described by F. D. Buffum in *Coal Age*, is ½ in. thick and the bolts used are the same as those in the rail-splice bars. No sledges, gages, spikes or spike pullers are needed for either laying or taking up ties; the only tool required is the wrench that is used for rail-splice bolts. As the ties rest directly upon the ground they may be spaced at intervals as great as six feet.

The bolt hole in the tie is made oblong to suit the diamond-shaped head of a track bolt so that the nut cannot turn while the nut is being tightened or loosened, particularly the latter because after the tie has been in use for a long time the nut rusts the tie the same as does the nut in the rail splice.

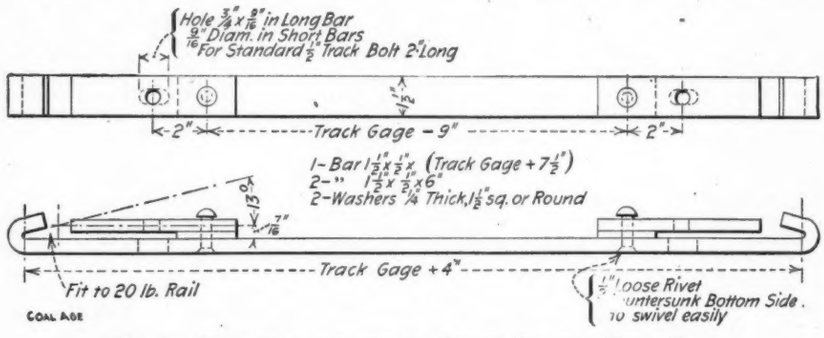

Hole ¾" x 2⅜" in Long Bar
2⅜" Diam. in Short Bars
For Standard ½" Track Bolt 2" Long
2"
Track Gage – 9"
2"
1- Bar 1½" x ½" x (Track Gage + 7½")
2-" 1½" x ½" x 6"
2-Washers ¼" Thick, 1½" sq. or Round
13°
Track Gage + 4"
Fit to 20 lb. Rail
COAL AGE
Countersunk Bottom Side.
To swivel easily

FIG. 1. MINE HAULAGE, STEEL TRACK TIE FOR MINE CARS

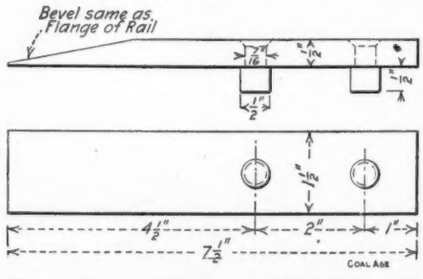


FIG. 2. STEEL MANDREL FOR SHAPING THE BENT ENDS OF STEEL TRACK TIES

In making the ties the holes are first punched or drilled to gage, then the bar to be bent is heated and a mandrel like that shown in Fig. 2 is placed on it for a form, over which the bent end is quickly shaped by a few blows of the hammer. All parts are thus made to the same gage. The bottom head of the rivet is countersunk as shown in Fig. 1, because it is easier to beat down such a head than it is to use a rivet set.

Details of Metallurgical Practice

Records of Experience in Ore Dressing, Cyaniding and Smelting

Cheap Steel Trusses

BY CLAUDE T. RICE

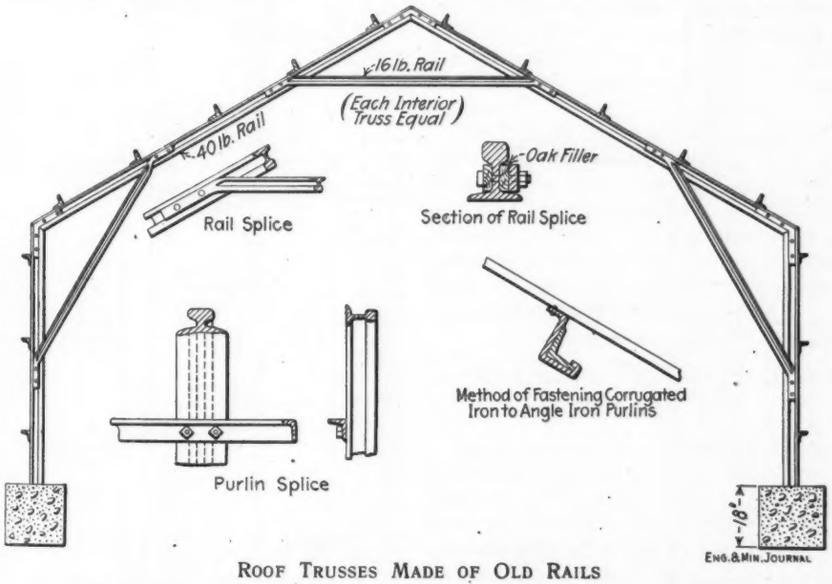
Steel trusses can be made cheaply at any mine where old rails are available. The span of the trusses is limited only by the size and length of the old rails at hand. Such trusses were used in building the change house at No. 3 shaft of the Desloge Consolidated Lead Co., in the southeastern Missouri lead district. Of course, there would be no economy if it were not possible to use up scrap material in this way.

The rails are built up into the truss with the flanges outward, as this allows the internal braces to be secured more readily to the main members. The rails are sawed off so as to meet at a fairly tight although rough joint and they are spliced together fish-plate fashion by splice plates that fit in snugly against the webs of the rails. Bolts are used to fasten the splice plates to the truss and two rivets are used, in most instances, at each end of the splice plates. The internal braces of the truss are also old rails of smaller section. For this internal bracing 16-lb. rails that are no longer serviceable or even 12-lb. rails can be used. These are heated and hammered down in the shop into a bar section and bent to the proper angle so as to be parallel at the ends. These are bolted to the rails forming the main members of the truss with a piece of oak as filling, so as to give a surface even with the side of the head of the rail for the auxiliary bracing, as shown in the accompanying sketch.

In the truss for the Desloge changeroom shown in the accompanying sketch, the unsupported portion of the main span is less than the length of the legs of each minor truss. The trusses are bolted together by the longitudinal bracing that ties the trusses together, and the longitudinal bracing that ties the trusses together is also bolted to them through holes drilled in the flange of the rails forming the main members of the trusses. These longitudinal braces that tie the different trusses are angle irons. In bracing the sides there is one brace about 18 in. from the top, another about 12 or 18 in. from the bottom and a third in the middle between these two, the side walls of the building being about 9 ft. high. The purlins of the roof are also angle irons, but are placed closer. The manner of attaching the corrugated irons to the purlins is shown in the sketch. A strap hook is used that comes up from around the bottom edge of the angle iron. This has a rivet of soft iron in the end of it by which the corrugated sheet is riveted to the clips. In this way the corrugated iron is tightly fastened to the purlins.

The trusses for the change house were raised and then held in place by the purlins. The first truss, after being raised with poles, had to be braced in position. The side purlin angle-irons were attached by one bolt in each to the vertical legs of the truss. Then the next truss was raised and the side purlins bolted to the second truss. Then the second bolt was put in at each purlin joint, and the two trusses tightly bolted together. After that, no more bracing was required as each truss was bolted to the purlins as fast as it was raised. This made a rigid structure so that there was no movement of the legs after the concrete for the pedestals for the trusses was poured around the vertical post. The rails forming the vertical legs of the trusses extend down into concrete about 18 inches.

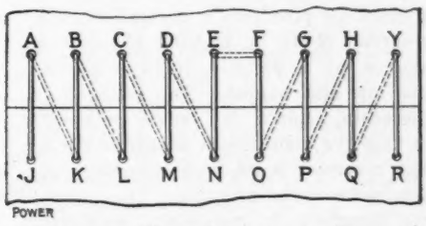
A strong and cheap truss is thus obtained. It is simple to build. Other than boring the holes in the flanges, there is nothing that cannot be done in any blacksmith shop, and no skilled workmen are required. All the bolting of the main trusses is done before they are erected, and in all instances 5/8-in. bolts are used. A truss of this kind is an excellent way of using up old rails that are no longer serviceable.



ROOF TRUSSES MADE OF OLD RAILS

Wire Lacing for Belts

When a tendency is exhibited by wire lacing to pull the ends of the belt out of line, Clifford Smith, in *Power* recommends the joint shown in the accompaning illustration. All the holes are made first, using a punch about 1/8 in. in diameter and punching the holes 1/2 in. apart. In drawing the lacing tight with pliers, the end of the lace only should be gripped as the pliers would otherwise nick the wire and cause it to break. The end nicked by the pliers will be cut off so there is no harm done in this way.



STYLE OF WIRE LACING FOR BELTS

To lace this joint, double the wire in the middle and put the ends through adjoining holes, as at *E* and *F*. From the back side pull both ends through until the loop is up tight on the belt, then take one end across on the face to the opposite hole as from *F* to *O*, then back to *F* and across to *O* again and then from *O* to *G* across the back, and so on to *R*. From *R* run to *Y* across the back, then through *Y*, and pull the wire tight in the direction of *R*. Finally cut off the

ends fairly close and hammer them down with the rest of the lacing. Treat the other end the same way.

This style of lacing equalizes the lateral strain and prevents disalignment of the belt. It has also been used successfully when using an annealed-iron wire when the regular wire lacing could not be obtained.

Water Supply for Laboratory Purposes

By W. J. Hulings*

The following is a description of a locally evolved automatic water still and heater in successful use in the laboratory of the Tennessee Copper Co. Essentially the apparatus consists of a still fed from a steam line, an overhead reservoir taking the distilled water, and two 40-liter carboys for the overflow from the reservoir.

Hot water from the reservoir flows through an overhead glass-tube main of ⅜-in. bore, and is tapped off at the various work benches by means of glass tees inserted in the main, and rubber tubing, 3/16-in. bore, dropped from the stems of the tees.

In Fig. 1, the still, *A*, is a lead tank, 24 in. high by 12 in. diameter, with a block-tin coil inside carrying the steam to be condensed, from a 1-in. steam pipe. Cold water for condensing purposes is obtained from a ¾-in. water pipe, *F*, emptying into a long-stemmed lead funnel, *G*, carrying the water to the bottom of the still. The waste water is carried off by the pipe *H*.

The distilled water is forced through a block-tin pipe into a covered block-tin reservoir *B*, 18 in. high by 12 in. in diameter, at a point *J*, midway between the top and bottom. The water in *B*, therefore, cannot fall below this point in case the main steam supply is cut off. The reservoir is set high enough to give a suitable water pressure. The water in the reservoir is maintained sufficiently hot for laboratory purposes by means of a steam coil in *B*. The steam pipe to the still is spliced at *L*, Fig. 2, and a tee inserted with a ½-in. globe valve just above. A tin pipe connects the valve and is continued into the reservoir at *M*. Inside, the tin pipe is coiled twice and continued out and down to where it is again spliced into the steam pipe at *N*.

The overflow and distributing system is best shown in Fig. 2. A block-tin pipe is burned into the reservoir at *O* and is connected with another tin pipe, *P*, open at the top to prevent siphoning the water from the reservoir. The lower end of this pipe is connected with the main line of the water supply for the laboratory. At a point, *Q*, on the upper end of the tube, opposite the level at which the overflow from the reservoir is desired, a short piece of tin pipe is spliced into the pipe *P* and is connected by means of glass and rubber tubing with a carboy *C*.

The two carboys, *C* and *D*, Fig. 1, take care of the overflow from the reservoir and supply the cold water for the laboratory. As the overflow water from the reservoir empties into *C*, part of it is siphoned over into *D*, thus keeping the water in the carboys at the same level. The water in *D* cools to room temperature and is siphoned off when needed through a long inverted U-tube, *R*. As it is desirable not to interrupt distillation, overflow from the carboys is provided for through a siphon tube. Water enters at *S* and is delivered to a drainage pipe at *T*. It is to be noted that the openings *S* and *T* are at the same level, thus preventing air getting into the tube at either end. This makes the siphon automatic.

The principal advantages of this system are: the use of a steam-heating coil instead of an induction coil; glass tubing throughout the laboratory, instead of iron piping; and continuous distillation, which eliminates the introduction of dirty greasy water from a cold steam line.

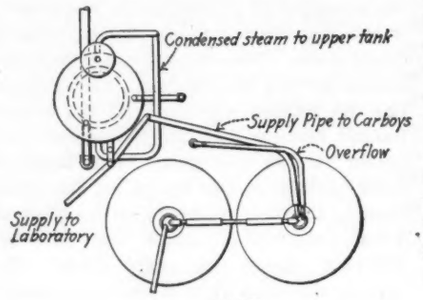


FIG. 3

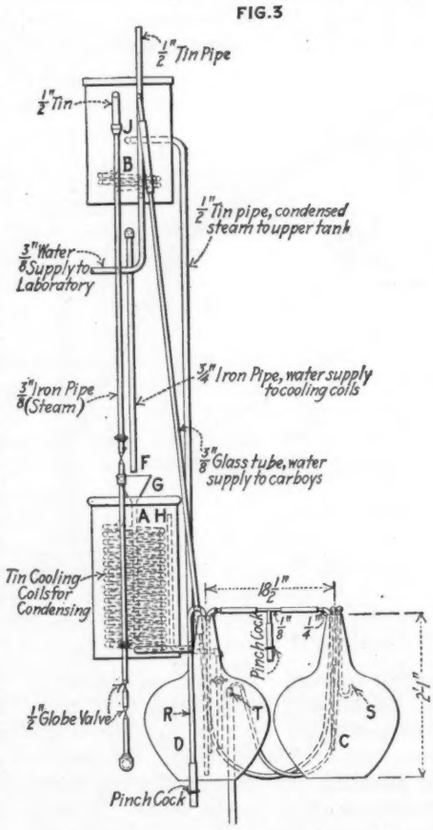


FIG. 1

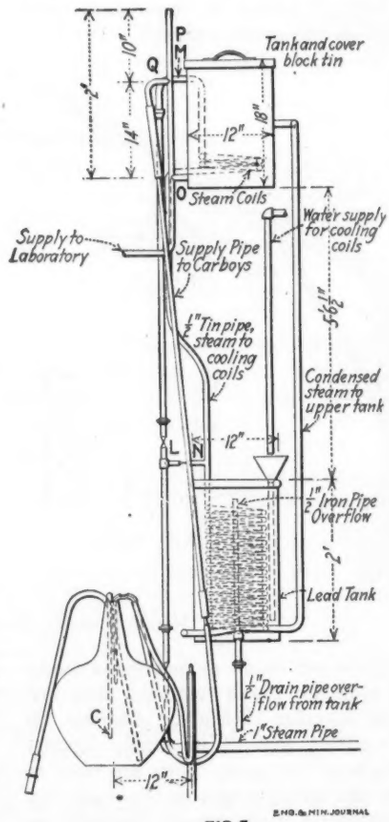


FIG. 2

CONTINUOUS LABORATORY WATER STILL

Lifting Pig Iron by Magnets

Heretofore the practice of handling furnace pig iron with electromagnets has been limited by the quantity that could be lifted under the ordinary plan of picking the iron from the ground or floor, says *Electrical World*, Aug. 10, 1912. With the pigs lying flat, only a relatively small number adhere to the magnet. At the Zenith furnace in Minnesota experiments have recently been made with stacking the pigs vertically, standing each pig erect on end. This arrangement allows a greater number of pieces to make direct contact with the magnet pole pieces, and the lifting capacity of the magnet is correspondingly increased. In fact, with a given magnet which was able to pick up only 1000 lb. of pigs lying flat, 2000 lb. can be lifted if the pigs are stacked vertically on the floor.

Where concentrates are dried for shipment as they are produced, it requires about one cord of wood for a hearth drier to dry 20 tons of concentrates, to about 3% moisture.

*Chief chemist, Tennessee Copper Co., Copperhill, Tenn.

The Cost of Doing Things

Data from Mining and Metallurgical Practice

Operations at the Butterfly Mine, Colo.

BY D. J. SAYER*

The operations for the year ended March 31, 1912, at the mines of the Butterfly-Terrible G. M. Co., may be of interest as showing what is possible when working under fairly favorable conditions.

The mill is equipped with 30 stamps of 1050 lb. and 9 Frue vanners. Water power is available for 7 months of the year and drives the compressor as well for the same period. An auxiliary steam plant is used for the other 5 months to assist the hydraulic power, as well as for heating purposes.

MILLING STATEMENT

Total dry tons milled	16,620.9
Value of heads	$2.992
Value of tails	0.578
Recovered by amalgamation	1.880
Recovered by concentration	0.534
Total recovery	2.414
Per cent. recovery	80.7
Troy oz. quicksilver lost per ton milled	0.074

TOTAL OPERATING COST

	per ton milled
Superintendence	$0.258
General expense	0.035
Labor Milling	0.327
Supplies for Milling	0.052
Heating	0.033
Renewals for Mill	0.052
Power & Flume upkeep	0.032
Assaying	0.008
Freight Concentrates	0.062
Smelting Concentrates	0.078
Mint Charges Bullion	0.006
Labor Mining & Development	0.810
Tramming Expense	0.110
Supplies Mining	0.126
Timber	0.059
Blacksmithing	0.022
Royalty	0.230
Total Costs	$2.300
Less other earnings	0.042
Net Operating cost	$2.258

The gold occurs in fine particles which necessitates fine crushing to release it. The screen used is a No. 159 Ton-Cap with a slot opening of 0.012 in. This reduces the stamp capacity to about 2½ tons per day, or about 2000 tons per month when operating at the full capacity of the mill. A good deal of trouble was encountered, when using the horizontal slot screens, on account of splitting, but when the vertical slot screen was used this trouble was overcome and the life of the screen more than doubled. No difference in capacity was noted.

For the first three months the ore milled was only 3248 tons, about half capacity, so that the cost for the first quarter was considerably higher than for the last part when, the mill running at full capacity, the milling cost fell to $1.88 per ton.

All stoping is done with hammer drills of the Waugh type and the ore trammed through a tunnel direct to the ore bins. The tunnel was run on a grade of 3 in. to 100 ft., so that a horse can pull from 10 to 12 cars at a trip. By this means all the tramming can be done on one shift.

Little timber is used in mining as 20 ft. of backs are left when starting a stope. The mill holes are carried up 20 ft. before stoping begins. All mill holes are rock built and will last for stopes carried from 250 to 300 ft. between levels. All ore extracted during the last year or more was from a depth of about 1600 ft. and it is found that the percentage saved is not so high as when ore from the upper levels was being milled.

The ratio of concentration was 36.3:1, the concentrate carrying on the average an excess of 30% iron over silica.

In cost accounting the drill repairs and tools are charged to mine supplies and shoes, dies, screens, quicksilver, oil and waste are charged to mill supplies. The mining cost includes development.

*Manager and lessee, Butterfly-Terrible Gold Mining Co., Ames, Colo.

Unit Costs, Pittsburgh-Silver Peak

The following data, furnished by W. A. Bradley, general manager of the Pittsburgh-Silver Peak Gold Mining Co., Blair, Nev., represents approximately the average standard of work at that mine. A month's record shows that 16,200 tons of ore were produced, 15,000 tons coming from stopes and 1200 tons from development work. In addition to this tonnage 400 tons of waste were mined in the stopes and 3000 tons taken from development work, making a total of 19,600 tons mined, of which 15,400 tons were credited to stoping and 4200 tons to development, which consisted of 609 ft. of drifts and crosscuts and 931 ft. of raises.

The rock mined consists of quartz alaskite, limestone, diorite and schist. Pillars are left standing for supports and practically no timber is used, only about 700 linear ft. of stulls being used per month in stopes and 900 ft. of stulls and 1100 bd.ft. of 3x12-in. lumber in development. Electric lights are used in main drifts and stations and candles in other parts of the mine; the consumption of candles is at the rate of four per man in eight hours. Laborers are Americans, Italians, Slavonians and Finlanders. About 87 are regularly employed at the mine, distributed as follows: Stoping, 38; development, 25; miscellaneous underground, 7, and surface, including shops, 17 men. Of the men employed in stoping, 12 were engaged in breaking ore, 18 shoveling ore to chutes, 6 in tramming to skip pockets and 2 in timbering. In development 15 were engaged in advancing and 10 in mucking and tramming.

From these facts it may be deduced that approximately an average of 7.5 tons of rock is broken per day, or 6.22 tons of ore is secured per man employed at the mines. In the stopes, 13.5 tons of rock were secured per day per man, which included waste at the ratio of one ton for every 37.5 tons of ore. Based upon the men employed in various occupations in the stopes, 42.8 tons of rock were broken per day per man engaged in breaking ore, 28.5 tons per day were handled through chutes per man engaged in moving ore to chutes, and 85.6 tons were trammed per day per man tramming from stopes. The average advance per day per man employed in running drifts, crosscuts and raises was 4.92 ft., reduced to man-hours for one foot of advance it required 1.63 man-hours, consisting of 0.98 man-hours for drilling and blasting and 0.65 man-hours for mucking and tramming. The ratio of waste to ore produced from both stoping and development was 1 to 4.77 tons and of development work to ore produced from stopes, 1 ft. for every 10.5 tons of ore mined, while development work produced 1 ton for every 1.28 ft. advanced. The miscellaneous men employed underground were equal to one man for every 76.5 tons of ore per day and surface men, including shops, were equal to one for every 31.5 tons per day.

The total dynamite consumption was 22,200 lb., 10,400 being used in stopes and 11,800 in development, indicating that it requires about 0.676 lb. in the stopes to break one ton of rock and 7.67 lb. in development to make one foot of advance. A total of 339 machine-drill shifts were run in the stopes, breaking approximately 45.5 tons per shift and 442 shifts in development advancing on an average of 3.5 ft. per shift. Water Leyner and Ingersoll-Rand piston drills are used in development. It requires about one hour to make a setup in drifts, and working an 8-hr. shift the drilling average

is about 35 ft. of holes. In stopes, air-hammer drills are used and the average drilling rate is 45 ft. per shift. The oil consumption per shift on piston drills is one-half pint and on stopers one-quarter pint. It requires 8 man-hours to sharpen an average of 225 machine-drill bits per day, using a drill sharpener and oil forge supplied with air blast from compressor line. The consumption of crude oil is 7 gal. per day, or about 1 gal. for every 34 bits.

Fourteen mine cars are used in the mine, the average distance trammed is about 700 ft. and the average life of each car is two years. The average consumption of lubricating oil is approximately 2½ gal. per month per car. One man shoveling from a rock bottom into car and tramming 700 ft., averages eleven 1⅓-ton cars in 8 hours, which is equivalent to 1.52 tons per man per hour. One man shoveling from a plat into car and tramming 1000 ft., averages six 2⅓-ton cars in 8 hours, which is equal to 1.575 tons per man per hour. A trammer loading from a chute and tramming 700 ft. averages forty-five 1⅓-ton cars in 8 hours, or 6.19 tons per hour.

In running 5x6-ft. drifts through fairly hard ground, the average advance is about 4 ft. per shift of 8 hours with one drill runner and one mucker, or 16 man-hours. The approximate time required for drilling is 5½ hours, or 68.8% of the total time. Air pressure ranges from 90 to 100 lb. According to these figures, an average of 7.5 cu.ft. of rock is removed per man-hour. In running a 5x4.5-ft. raise through fairly hard ground, it requires one man on an average of 8 hours to advance 3 ft., drilling 4 hours per shift and timbering 1½ hours. The average dynamite consumption is 27 lb. per shift, 9 lb. per ft. of raise or 1 lb. per cu.ft. of rock broken. The advance is equal to 0.375 ft. of raise, or 8.45 cu.ft. of rock per man-hour, of which 50% is required for drilling and 18.8% for timbering.

Machine Drilling at the Robinson Deep

The following will show the increased drill efficiency obtained at the Robinson Deep Gold Mining Co., Transvaal, S. Africa. This is due partly to the increased efficiency of labor but chiefly to a more careful study of drilling operations, improvement in design of 2¾-in. stope drills, higher air pressure and better drill steel.

During year ending March 31, 1911, hammer boys worked 144,755 shifts and broke 0.076 fathom per shift. Small machines, 2¾x2½ in., were operated 23,439 shifts and broke 0.55 fathom per shift and large machines, 3⅓ in., drilled 18,718 shifts breaking on an average of 0.63 fathom per shift. During year ending March 31, 1912, hammer boys worked 90,872 shifts and broke 0.072 fathom per shift, small machines drilled 32,320 shifts at the rath of 0.701 fathom and large machines drilled 11,969 shifts breaking an average of 0.76 fathom. On this basis the ratio of small machines to hammer boy was 7.24 in 1911 and 9.7 during 1912, and large machines 8.34 and 10.6 respectively.

Construction and Operation of the Tigre Mill

Mill construction and operating costs at the Lucky Tiger mine, El Tigre, Sonora, Mex., are given by D. L. H. Forbes in *Bull.* A. I. M. E., August, 1912. The building of the cyanide plant, the No. 2 mill, and the remodeling of No. 1 mill, were done under somewhat adverse conditions, owing to the revolution in Mexico at the time, and consequent unsatisfactory labor conditions, but the work was completed in 14 months from the time that the preliminary plans and estimates were approved by the directors of the company.

The following unit-cost figures, expressed in United States currency, on the construction work may be of interest, as an example for a property situated in northern Mexico off the railroad: Excavation, medium-hard ground with boulders, 16,103 cu.yd. done at an average cost of $0.64 per cu.yd. Cement masonry, with stone partly dressed, 1850 cu.yd. done at an average cost of $7.40 per cu.yd. Cement concrete, 10% of which was reinforced, 972 cu.yd. done at an average cost of $12.28 per cu.yd. Carpentry work, buildings, launders and miscellaneous, 320.3 M. board feet of lumber, put in at an average cost (including cost of the lumber) of $84.24 per M. Steel tanks, assembling, riveting and calking, 247 tons of steel were put up at an average cost of $26.38 per ton. The total cost of the cyanide plant was $221,208, of which $11,203 was spent on testing and preliminary investigations.

The total cost of the No. 2 mill was $50,104, made up as follows: Excavation, $2518; foundations, $9813; carpentry, $14,723; local handling, $761; machine work, $2710; testing, $59; supervision, $1479; electrical work, $573; painting, $231; miscellaneous, $246; first cost, freight and duty, $16,991.

UNIT COSTS OF CYANIDE-PLANT SUPPLIES AT EL TIGRE

Mine quartz for tube mills, per lb.	$0.00379[1]
French flint pebbles, size A, per lb.	0.02138
Danish flint pebbles, sizes C and D, per lb.	0.02397
Zinc dust, 92% metallic zinc, per lb.	0.075
Sodium cyanide, 130% KCN, per lb.	0.2247
Burned lime, 38 to 40% CaO, per lb.	0.0155
Borax glass, per lb.	0.1375
Sodium bicarbonate, per lb.	0.07
Fluorspar, per lb.	0.0745
Sodium nitrate, per lb.	0.085
Graphite crucibles, No. 125, each.	9.54
Gas oil for melting furnace, per gal.	0.375
Gasoline, per gal.	0.4385
Hydrochloric acid, commercial, per lb.	0.119
Lead acetate, per lb.	0.12

[1] United States currency.

The average consumption of supplies in the cyanide plant is as follows: Sodium cyanide, 5.08 lb. per ton of tailings treated; lime, 52% CaO, 23.0 lb. per ton of tailings treated; zinc dust, 1.3 lb. per ton of tailings treated; ratio Zn to Au plus Ag as 1.52: 1; gas oil for melting, 0.025 gal. per oz. of bullion produced; flint pebbles, 8.7 lb. per ton of tailings treated.

MILLING COSTS PER TON OF ORE MILLED AT EL TIGRE

	November, 1911		October, 1911	
	No. 1 Mill	No. 2 Mill	No. 1 Mill	No. 2 Mill
Crushing	$0.496	$0.413	$0.566	$0.405
Grinding	0.269	0.021	0.291	0.029
Concentrati'g	0.961	0.239	1.225	0.521
Construction	0.169	.....	0.189	
	$1.895	$0.673	$2.271	$0.955

The cost of cyanide treatment at El Tigre is very high, owing chiefly to the large consumption of cyanide. The following are representative average costs for the various steps in the process: Conveying and screening tailings, $0.11; tube milling, $0.65; classification, elevation and dewatering, $0.22; treatment, $1.50; filtration, $0.30; precipitation, $0.14; melting, $0.19; total, $3.11 per ton.

From 62% to 64% of the gold and silver in the mine ore is recovered in the form of concentrates and sorted grade. The recovery by cyanide treatment of the concentrator tailings is about 82%, and of the dump tailings about 85%. The total recovery by sorting, milling, and cyaniding is from 93% to 95%.

Trucking Costs

The following figures show the comparative costs of running three double-truck teams and a four-ton motor truck, which replaced them. It will be noted, says the *Iron Trade Review*, Aug. 8, 1912, that no depreciation is figured on the horse trucks. The motor truck at first ran 484 miles per month, consuming 7.6 gal. of gasoline, and two gallons of oil per day.

THREE DOUBLE TRUCKING TEAMS

Cost of six horses at $300	$1,800
Cost of three wagons at $450	1,350
Cost of six harnesses at $35	210
Cost of keeping horses, $25 a month	1,800
Repairing harnesses, wagons, etc	100
Interest on investment	336
Drivers' salaries, $12 a week	1,872
Total, horses	$7,468

"KISSEL-KAR" FOUR-TON TRUCK

Cost of 4-ton truck	$3,800
Gasoline, 2,400 gals. a year at 10c	240
Oil, 156 gals. a year at 23c	36
Driver's salary at $18 a week	936
Amortization, 10 per cent on $3,800	380
Interest on investment	380
General overhaul, once a year	150
Total, truck	$5,922
Balance in favor of motor vehicle	$1,546

Copper Butte, Ariz., A Volcanic Throat

By Frank H. Probert*

A plugged volcanic throat, which evidences explosive volcanism, near Ray and a short distance east of Florence, Ariz. The expelled breccia is cemented with a material which carries copper. Black, manganiferous copper silicate exists as at Miami and Ray.

*Geological and Mining Engineer, Los Angeles, Calif.

The present topography of the Mineral Creek district, in which the Ray orebodies are found, was determined largely by great crustal movements in late Tertiary —post-dacitic times. The series of northwest southeast faults, roughly paralleling the line of Mineral Creek are later than the dacite, and therefore post-mineral. The downthrown fault blocks to the east offer, in restricted areas, possibilities of workable orebodies, as proven by a number of drill holes put down by the Arizona Hercules Copper Co. In the Miami district, similar post-dacitic fractures evidence rock adjustment following a period of great dynamic disturbance.

At Copper Butte, an old volcanic throat bears testimony to explosive volcanism at the close of the Tertiary age, an age which gave to the mining world a vast petrographic province, rich in mineral resources, extending from northern Nevada to southern Mexico.

Schists and Porphyry Exposed Near the Butte

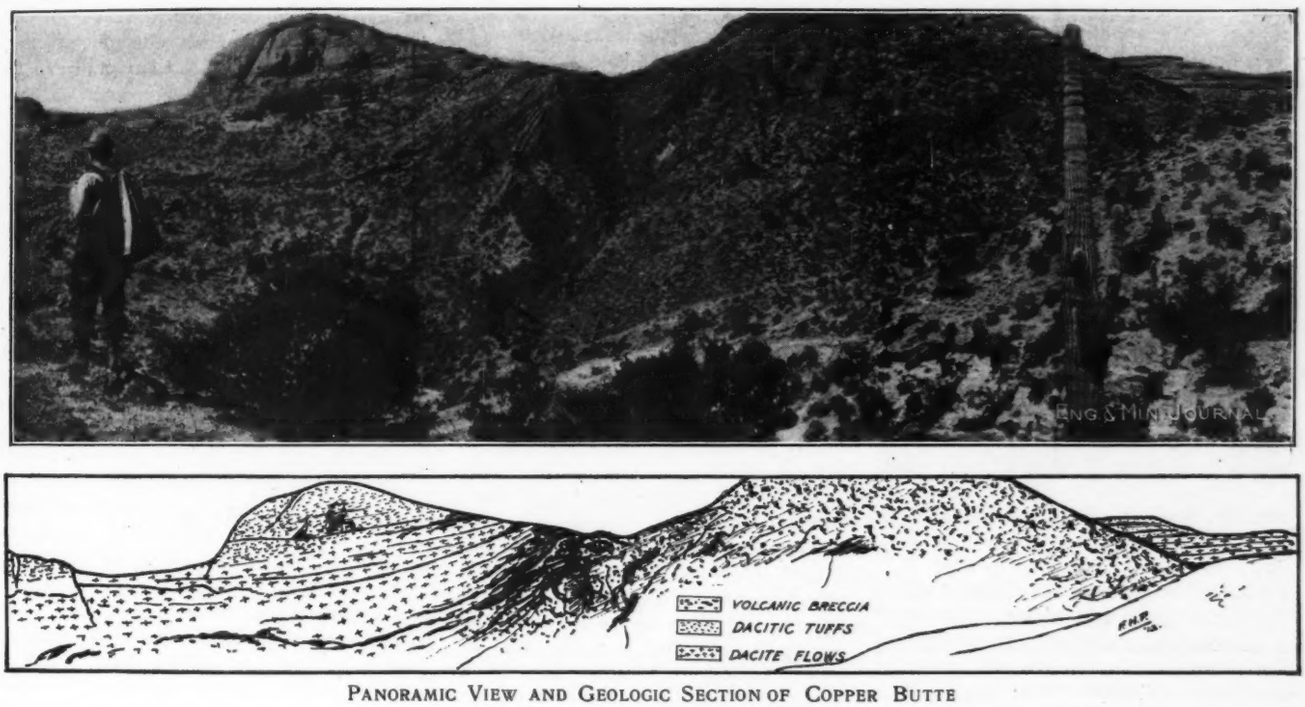
Copper Butte rises nearly 2000 ft. about the Gila River in a range of grotesquely carved dacitic hills, about 18 miles east of Florence, and four miles southwest of Ray. On account of surface indications of copper, a group of claims was located, the examination of which enables me to give the following description of the property. The group lies well within the mountainous tract east of the Florence valley composed of rhyolitic and later dacitic lavas, resting upon an eroded and hilly surface of schist, sedimentaries and granite. In the valley of the Gila and its tributaries, the volcanic mantle was relatively thin, and has been stripped by erosion, exposing the older rocks, but leaving remnants of the lava flows as rough cragged mountain tops. Near the Butte, the gray schists and later granitic porphyry are exposed over large areas; the limestones and quartzites are conspicuous by their absence.

A careful study and correct interpretation of the geologic structure was necessary to determine the commercial value of the claims examined. The coarse biotite granitic porphyry is fresh though crumbling from surface disintegration, and shows but little evidence of mineralization, except near the contact with diabasic dikes. Local development of aplitic dikes in the granite are common. The exposed schist areas are copper stained in places, and are generally of a reddish color from surface oxidation of contained pyrite. Dacite flows and well bedded soft friable dacitic tuffs once covered the whole section studied and the dissection of the region by erosive forces has revealed the presence of volcanic necks, through which all the rocks were alike expelled by explosive action.

Throat Filled with Consolidated Breccia

The copper-bearing area of Copper Butte is part of one of these throats, broken through the schist, granite, sedimentaries and dacite flows, and filled by its own products, part of the ejected fragments falling back into the throat, forming a plug of consolidated breccia against which the dacite flows have been steeply upturned. In surface exposure the throat would seem to be about half a mile wide by three quarters long, roughly elliptical in shape. The walls are noticeable in a number of places showing sharp contracts of dissimilar rocks. However, a large part of the rim is obscured by the breccia mantle. The breccia is singularly sharp and angular with but a small amount of cementing material. The fragments are only slightly altered; schist predominates, a dark sericitic variety of the Pinal schist, while quartzite blocks two and three feet across are not uncommon. Limestone fragments partially altered are seen at the bottom of the Wallace shaft.

A study of the dacitic flows and tuffs suggest intermittent explosions, with pe-



Panoramic View and Geologic Section of Copper Butte

riods during which lavas flowed over the walls of the throat, catching up some of the breccia. Angular fragments of schist are seen included in the consolidated flows. Large masses of black dacitic glass, obsidian, the result of rapid cooling or chilling of the outpoured lava, were noted within a few miles of Copper Butte.

Copper Occurs in Spaces Between Rock Fragments

The breccia filling the throat and covering the hill slopes to the east is more or less commercially mineralized with copper carbonates and silicates. Sulphides are rare, showing occasionally as minute pyritic grains in the fresh schist. The copper occurs as a staining of a dull earthy brown matrix filling the space between practically unaltered rock fragments. Streaks and patches of chrysocolla are found in the mass while part of the breccia is cemented by the oxides of iron. The oxidized breccia is, however, only a small part of the total brecciated mass which extends northward to Walnut Cañon. Generally speaking,

Dacite-breccia Contact, West Side of Throat

the evidence of solfataric action is slight, although locally and always where ore is developed, limestone fragments are less common. It is probable that the last phase of activity was expressed by feebly active vapors rising through vents and lines of weakness developed in the throat. Limestone fragments were dissolved, granitic particles show impregnation with pyrite and stains of copper silicate.

The original nature of the cementing material can only be surmised. North of the Butte, it appears to be merely finer dust-like particles of the same rocks as the included fragments, but to the east of the orebody the breccia shows a cement of dacitic dust with fragments of sanidine, fresh black biotite and occasional quartz particles.

The red ochreous gossan outcrops may be the result of oxidation and leaching of pyritic grains in the schist and granite fragments, although had they been generally pyritized, the sulphuric waters produced by meteoric oxidation would probably have caused more marked alteration of the brecciated rock fragments than is apparent.

Segregation of Copper Pitch Is Noticeable

Two shafts have been sunk in the throat walls, but the work done is insufficient to prove the real value of the ground. Rock fragments cemented by iron oxides were found to a depth of 105 ft., with erratic masses of silicate ore, but below this for 260 ft., unaltered non-mineralized breccia was encountered.

A noticeable feature of the ore-bearing section of this volcanic throat is the segregation of black manganiferous copper silicate—copper pitch. This mineral is common in the dacite fractures of Miami and Ray; it is not a direct oxidation product of sulphides in place, but is of exotic origin. Colloidal silicates of the same composition, however, are frequently found in the upper levels of the Ray Central mine, which on being dehydrated give identically the same analysis. This colloidal chrysocolla at Ray Central, is unquestionably a product of the oxidizing cupriferous sulphides. The source of this mineral at Copper Butte is still obscure but it is found as a coal-black and vivid-green, soft, resinous substance cementing rock breccia and again as nodules in the fragmental mass. It also occurs in thin crusts and films in fault slips throughout the matrix. It may be said that the ore carries a higher percentage of copper than its appearance would indicate.

The Evolution of Ore Flotation

The evolution of flotation methods and their importance in modern mining is treated by Dr. Leo Herwegen, in *Glückauf,* July 27, Aug. 3, 1912 (abstr., *Min. Journ.,* Aug. 10, 1912). Taking all the processes devised, collectively, the author divides them on the basis of their peculiar theoretical points into two main categories: (I) Processes based opon the rising power of solid matter in liquids; and (II) processes based upon the surface tension of liquids and the resistance connected with it. The first category is sub-divided into four groups: (a) Those based upon the power naturally inherent in certain minerals of rising in liquids of higher specific gravity; (b) those based upon the artificially increased tendency to rise conferred upon certain minerals by their capacity of adhesion to certain gases; (c) those based upon the artificially increased tendency to rise conferred upon certain minerals by their capacity of adhesion to oils as well as to gases; (d) those based upon the artificially increased tendency to rise conferred upon certain minerals by their capacity of adhesion to oils, assisted by a vacuum. The second category is subdivided into: (a) Processes based solely upon the resistance of the smooth surface of a liquid; (b) processes based upon the increased resistance inherent in emulsion foams.

The only method which can properly be said to belong to the I(a) group is that connected with an ingenious apparatus patented and introduced by the German Humboldt Engineering Co. It is simple in its principle as well as in its application, and efficient in working. Group I(b) includes several processes worth mentioning; i.e., those of Potter and Delprat, first practically adopted 10 years ago by the Broken Hill Proprietary Co., but since then superseded in favor of more perfect and suitable methods, and the De Bavay and Sutton processes. The third group includes a very large number of practically proved methods; among others, the Leuschner process, adopted at the Friedrichssegen works in Germany (Eng. and Mining Journ., May 11, 1912) the Siegge process, which reduces oil consumption to a minimum; the Hoover and Cattermole methods, and the improved process and apparatus lately introduced by Messrs. Sulman and Picard. A good representative of the fourth group is the Elmore process, which embodies both vacuum and flotation technics. As types of the first group of the second category, Doctor Herwegen describes the Macquisten, Brackelsberg, and Jeffrey methods, while as representatives of the II (b) group he cites the emulsion processes acquired by the Minerals Separation, Limited. All the above-mentioned methods, as well as the different plants for working them, are minutely described by the author, and, regarding the Elmore and the Minerals Separation processes, detailed calculations of installation and working costs are added. In conclusion, the author states that the inventors engaged in the elaboration and evolution of the flotation method have achieved great results within a comparatively short space of time. They have successfully pointed out to the mining industry the ways leading to the cheap and suitable concentration of poor ores, and they have evolved several processes which have become of the greatest importance in judging the payability of numerous ore deposits. An advantage common to all flotation processes, he concludes, is that they make it possible to separate without any difficulty minerals of approximately equal specific weight, as, for instance, zinc-blende from spathic iron, a problem which causes the greatest trouble in all mechanical processes.

The occurrence of alunite in the San Cristobal quadrangle, Colorado, is reported by the U. S. Geological Survey. The mineral is of interest as a possible source of potash.

Churn Drilling in New Mexico

By I. J. Stauber*

In drilling 114 churn-drill holes of a total aggregate depth of 62,208 ft., in the Burro Mountain district of New Mexico, the average cost was $2.18 per foot. Mother Hubbard bits, and rigs 36 ft. high were used. Cast-iron plugs were inserted in crooked holes to guide the bit in straightening the hole.

*Superintendent, Savanna Copper Co., Silver City, N. M.

Attempts have been made at various times to prospect by drilling methods the mineralized area of the Burro Mountain mining district. Owing to the shattered condition of the rock and the many nearly vertical, hard, slip planes, considerable trouble was experienced. The country rock is an altered monzonite porphyry, and, except for slips, dikes, etc., is not very hard. The copper occurs as disseminated chalcocite. Caving, and crooked holes seem to be the most serious difficulty, although the previous unsatisfactory results were mostly due to inexperienced drillers.

Late in January, 1910, two Star 23-T machines were installed to prospect and develop the extensive holdings of the Savanna Copper Co. These two machines were operated almost continuously until Oct. 19, 1911. Each machine was operated two 12-hr. shifts per day; for the first 10 months they were operated seven days per week, and after that no drilling was attempted on Sundays and holidays, except in case of hole trouble, caving or fishing for tools. I might state that this system of "days off" kept the men in much better condition, resulting in a more steady crew and an increased footage per month.

High Masts Desirable in Crooked-Hole Country

All-steel Mother Hubbard bits were used, of special design, being especially long and thick. The height of mast, 36 ft. above ground, prevented using anything longer than a 35-ft. string of tools. In a crooked-hole country I am satisfied that a 50- or 60-ft. string of tools would be much better than one only 35 ft. long. In Fig. 1, both the Mother Hubbard and the regular form of bit, are illustrated.

Most of the holes were started with a 10-in. bit, but 11- and 12-in. bits were tried several times. The larger bits seemed to undercut on a small short stem, resulting in a rough hole. Eight-inch casing was used to follow the 10-in. bit, but seldom could be made to follow to sufficient depth to be of much service. No casing was driven. If it did not go down of its own accord, the next smaller size was used. As a result little or no casing was ever lost. The following-bit sizes used were 8-, 6-, and 4½-in., with 6¼- and 4¾-in. steel casing.

It was absolutely necessary to continue each bit size as deep as possible, regardless of any caving. This caused more or less trouble, and sometimes necessitated taking long chances, but was the only means of gaining depth with our limited strings of casing. Of course any time the sludge showed copper, the hole was immediately cased. The thickness of the surface-leached material varied considerably, being from a few to 700 or 800 ft., probably an average of 500 to 600 feet.

Crooked holes and many other troubles can be prevented to a large extent by proper dressing of the bits. With the thermometer around 100° F., in the shade, it is no easy task to dress these bits; hence nearly all drillers are inclined to run a bit too long. A properly dressed bit causes little trouble in the hole. Avoid all moon faces, irregular shapes, etc., and keep water courses open for speed. In many instances fresh bits were put on every five-foot screw, and bits were never run for more than 15 or 20 ft. The bit is an all-important factor in drilling, and cannot receive too much attention.

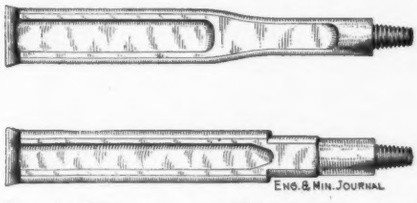


Fig. 1. Regular and Mother Hubbard Pattern of Churn-drill Bits

Methods of Straightening Crooked Holes

Of course, crooked holes will occur, and these were straightened by dropping cast-iron or rope into the hole. Either of these materials would hold the tools up and permit a shoulder to be cut. Cast iron seems to be the better, as it is more easily removed when the hole has been straightened. Reamers and straighteners were not of much use, probably on account of the extreme difference in hardness of the two sides of the hole. In particularly difficult cases, blasting was resorted to, but as this always caused a cave, it was avoided if possible. When blasting, great care should be exercised to place the shot properly, or more damage than good will result. Various sizes of tin tubes were used, holding from 50 to 100 lb. of 60% dynamite. One of these tubes was carefully placed at the top of the crook, and then exploded by dropping in a small tin tube, 1½-in. diameter by 18 in. long, containing two sticks of dynamite and two strings of fuse and caps. When blasting under water, the hole should be cleared of casing, otherwise the casing is liable to be split its entire length.

After encountering ore, the upper portion of the hole was cased, and the ore then drilled in sections of 20 ft. each, by drilling ahead for sample, casing, drilling for sample, reaming, etc. Owing to caving, it was not always possible to follow this scheme, but it was the system used when conditions permitted. The hole was sampled every five feet, and all sludge was put through the mechanical splitter shown in Fig. 2. This splitter was designed by me, and, if carefully made, will actually cut to 1/16 and give a reliable sample, as was demonstrated by numerous tests on prepared sludges. Any carpenter can easily make one of these splitters in a day or two. We found cypress to be easily worked and satisfactory for this purpose.

After each foot of drilling, the hole was bailed as clean as possible. When drilling under water, the bailer was run 15 times. This seemed more than was necessary, but insured good results. After going through the splitter, the sludge from this five-foot sample amounted to from one-third to one tub full, depending on conditions. This tub sample was then further reduced by pouring it back through the splitter at its various sections. If the sludge appeared to show ore, it was cut to about four gallons; if not, it was reduced to one gallon. This last sludge was then poured into one-gallon milk cans with tight covers, and hauled to the assay office, usually a mile or more distant. This mud sample was there dried on a large sheet-iron oven, in 10x12-in. drip pans. This final drying, quartering, etc., was done by an assistant directly under the supervision of the assayer. About five cords of wood per month were required for this drying.

Copper Determined by Cyanide and Iodide Methods

All sludges were assayed by the cyanide method, and all assays showing more than 2% copper were checked by the iodide method. Two pulps of every sample were kept, each weighing about 1/3 lb., one being from the assayer's pulp and the other from the dried sludge not bucked down. Five-pound samples were also frequently kept for panning tests. All of these samples were filed in order in a warehouse.

Driller Relieved of Sampling

Two samplers, working 12 hr. each, were kept at the rigs, one working the day and one the night shift. When the drills were not in ore, the drillers took care of the sampling, and the sampler was employed in bringing maps and other data up to date. Sampling is simple work, and can easily be taken care of by the drillers, but their work is apt to be unreliable. Each driller's footage was recorded, and he knew it; he therefore took care of his monthly footage. The sampler's duties were to prevent errors in depth, cleaning splitter, tubs, cans, etc. The driller bases his measurements on the length of rope, which gives a slightly inaccurate result due to stretching of the rope. The sampler checks these measurements with a steel tape. This division of responsibility between the driller and sampler permits the driller to give his entire time and attention to drilling, with no chance for excuses.

Everything consistent with good management was done to make the work agreeable. The drillers were protected by a rough, iron housing. This shed and platform, while costing but little, furnished satisfactory protection from the weather, and could be used over and over again. The bunk and boarding houses were kept to a high standard—so high in fact that they were operated at a loss, but the loss was more than offset by the steady crews and the final cost sheet. We considered a driller to be of little or no value until he had completed at least two holes, and had learned the peculiarities of the formation. Both drills were kept close together whenever possible, for convenience in sampling, repairs, water, teaming, casing, use of the fishing tools, and general economy.

All sludges were panned at drill by the sample man, and all details noted in book form. The report sheets of the holes were forwarded to the eastern office upon completion of the holes. Daily cards were also forwarded, showing the latest information on each hole.

TABLE I—COST OF DRILLING AT PROPERTY OF SAVANNA COPPER CO.

	Jan. 31,1910 to July 31, 1910		Aug. 1, 1910 to Oct. 10, 1911		Jan. 31, 1910 to Oct. 19, 1911	
	Feet drilled 12,032		Feet drilled 19,072		Feet drilled 31,104	
	Number of holes 29		Number of holes 28		Number of holes 57	
	Average depth 415 ft.		Average depth 681 ft.		Average depth 545 ft.	
Labor	Amount	Per ft.	Amount	Per ft.	Amount	Per ft.
Runners	$3,964.25	$0.329	$9,097.22	$0.477	$13,061.47	$0.420
Helpers	2,691.37	0.224	5,865.00	0.307	8,556.37	0.275
Assaying and sampling	1,816.33	0.151	4,551.87	0.239	6,368.20	0.204
Teaming	532.87	0.044	1,425.56	0.075	1,958.43	0.063
Foremen	1,018.75	0.085	1,773.85	0.093	2,792.60	0.090
Clerks	225.00	0.019	551.08	0.029	776.08	0.025
Roads	1,377.46	0.114	1,095.10	0.057	2,472.56	0.080
Total Labor	$11,626.03	$0.966	$24,359.68	$1.277	$35,958.71	$1.157
Supplies						
Fuel and coke	$2,760.62	$0.229	6,496.30	$0.341	$9,256.92	$0.298
Oils and grease	64.73	0.005	507.79	0.027	572.52	0.018
Road supplies	76.28	0.006	36.17	0.002	112.45	0.004
Cables and sand lines	528.31	0.044	2,697.37	0.141	3,225.68	0.104
Drill tools and repairs	650.72	0.054	2,536.12	0.133	3,186.84	0.102
Surface tools and repairs	48.14	0.004	361.20	0.019	409.34	0.013
Repairs to machine and boilers	188.18	0.016	795.57	0.041	983.75	0.032
Lighting	116.94	0.010	146.56	0.007	263.50	0.008
Barn supplies	273.50	0.023	793.09	0.042	1,066.59	0.034
Building material	186.87	0.016	282.78	0.015	469.65	0.015
Chemicals and engineering supplies	179.21	0.015	740.44	0.038	909.65	0.029
Stationery and printing	28.40	0.002	45.35	0.002	73.75	0.002
Telegrams	47.11	0.004	47.82	0.003	94.93	0.003
Transportation	345.35	0.028	410.95	0.022	756.30	0.025
General supplies	71.21	0.006	607.59	0.032	678.80	0.022
Depreciation	1,200.00	0.100	3,275.00	0.172	4,475.00	0.144
Casing	61.65	0.005	749.95	0.039	811.60	0.026
Total	$6,827.22	$0.567	$20,520.05	$1.076	$27,347.27	$0.879
Pumping Plant						
Labor	$870.75	$0.072	$1,226.35	$0.064	$2,097.10	$0.068
Fuel	815.17	0.068	812.41	0.043	1,627.58	0.052
Oils and grease	21.76	0.002	91.59	0.005	113.35	0.004
Repairs to pump	31.56	0.003	65.74	0.003	97.30	0.003
Repairs to pipe line	77.20	0.006	368.73	0.019	445.93	0.014
Total	1,816.44	$0.151	$2,565.82	$0.134	$4,381.26	$0.141
GRAND TOTAL	$20,269.69	$1.684	$47,444.55	$2.487	$67,714.24	$2.177

Analysis of Cost Sheet

The costs of 20 months' drilling are shown in Table I. Table II is a schedule of time consumed for the different operations and Table III is the scale of wages paid. During the first 16 months of drilling, the foreman looked after the rigs and repairing; for the remaining 4½ months this foreman was also a drill runner. With more than two rigs, we consider it advisable to have a man to act as foreman only.

Regular drilling-machine boilers were used for the first 14 months; for the remaining time we used 20-hp. auxiliary boilers, mounted on wheels. After the installation of these latter boilers, the regular boilers were used for moving only. This arrangement effected a coal saving as follows:

Coal per machine, per 24 hr., regular boilers	1.37 tons@$8.30 =	$11.37
Coal per machine, per 24 hr., auxiliary boilers	1.07 tons@$8.30 =	$ 8.88
Saving	0.30 tons	or	$2.49

The above data were calculated for full period of drilling, 20½ months, using steaming hours only.

For the first 13 months depreciation was calculated at $100; for the remaining 7½ months at $150 per machine per month.

The cost of the machines, fully equipped with tools, rope, fishing tools, boilers, etc., all on the ground, erected and ready to drill with, was $7499.73. This cost, however, does not include any casing. Both machines, after more than 20 months' use, are today in fair condition. I therefore consider $125 per machine per month a proper depreciation charge, provided one contemplates considerable drilling. After the machines were thus fully equipped as above, all tools, repairs, supplies, etc.,—in fact everything sent to either rig, was charged out directly against it. Casing was charged out monthly as lost or destroyed.

TABLE II—TIME TABLE OF 20 MONTHS DRILLING

Time of drilling	20 mo.
Total feet drilled	31,290 ft.
Possible hours drilling [1]	27,024 hr.
Progress per hour of possible time	1.15 ft.
Actual hours drilling	13,342 hr.
Progress per hour of time drilled	2.09 ft.

Lost Time

	Hours	%
No water	782	2.9
Repairs (machine or tools)	1531	5.7
No help	1041	3.8
Fishing	1314	4.9
Casing and pulling casing	1472	5.4
Moving and erecting	2904	10.7
Reaming and bad hole	2482	9.2
Miscellaneous (rain, sickness, etc.)	231	0.9
Total time lost	11,757	43.5

[1] Possible machine hours for two machines per total time of drilling deducting only Sundays, holidays and a short period when drilling was discontinued.

TABLE III—SCALE OF WAGES

Drillers	$6 per day of 12 hr.
Helpers	4 per day of 12 hr.
Samplers	$110 per month
Mexican labor (roads etc.)	$1.75 per day of 9 hr.
All supplies hauled by wagon 14 miles	$3.50 per ton.

Detail costs were kept of each hole. The cost per foot appears to increase directly with depth, but, on plotting our cost per foot with depth, too much irregularity was found to determine any positive relation. Our last three months of drilling, a total of 6258 ft., was in unusually favorable ground. The average depth of hole for this period was 782 ft., at a total cost per foot of $1.98. The item of pumping is rather high, as the water is not exceedingly abundant in the district. Our water supply was at times inadequate and required steady pumping. The water was pumped from two to four miles, and this long line of pipe, uncovered and over rough country, caused serious trouble and delays, espe-

cially in freezing weather. The water requirements amounted to from 1000 to 3000 gal. per machine per 24 hr., depending on size of hole and whether drilling above or below water-level.

There is as yet little activity in the Burro Mountain mining district. Up to the present, nearly all operations have been confined to development. The Burro Mountain Copper Co. has a 300-ton mill, but this has not been in operation since 1908. The Burro Mountain Copper Co., Chemung Copper Co. and Savanna Copper Co., the three leading companies in the district, each have a large tonnage of commercial ore developed. With the present condition of the copper market, it is probable that the district will soon see greater activity.

Longitudinal Railway of Chile

The completion of the Longitudinal Railway from Santiago to Iquique promises much for the mining interests in the north of Chile. The work is progressing rapidly and should be completed by 1914, when a large section of rich mineral lands will be provided with good transportation facilities. The following quotation, taken from the *South Pacific Mail*, of Valparaiso, gives the views of Arthur MacDonald, the Canadian engineer connected with the Northern Longitudinal Railway. In his opinion the copper mines which abound in the Province of Antofagasta will necessitate the construction of at least one smelting establishment in Antofagasta, as the service of the Longitudinal Railway will insure the carrying of ore to the coast. All the mine owners are anxious that smelting works be established, to enable them to sell their ore at prices equal to what they would receive in European markets. He further asserts that there are now sufficient nitrate grounds to warrant the working of 10 more large *oficinas*. American interests are now examining mining properties in that section of the country.

Preservation of Mine Timbers

The Forest Service of the U. S. Department of Agriculture, in Bulletin 107, by E. W. Peters, gives some interesting data on the preservation of mine timbers. A few extracts are given herewith. The wood-preserving plant of the Anaconda Copper Mining Co., erected at Rocker, Mont., with a capacity of about 570 cu.ft. of timber per run, has the following equipment: One treating cylinder 43 ft. long by 6 ft. in diameter; workng pressure, 100 lb. per sq.in.; one receiving tank, 47 ft. long by 5 ft. in diameter; two measuring tanks, 12-ft. diam. by 17 ft. high; one general service pump, 360 gal. per min., at 125 lb. per sq.in.; one pressure pump, 60 gal. per min., at 125 lb. per sq.in.; one vacuum pump, 7x10x6 in., and jet condenser; 18 cylinder cars and one hoist engine. The total cost of this plant erected was approximately $15,000.

In the accompanying table is given the detail of the cost of untreated and creosoted 8-in. Douglas fir shaft sets placed in the mines of the Anaconda company. These sets contain 1127 b. ft. of squared Douglas fir timbers from the Pacific coast, and 393 b. ft. of lagging. The average absorption secured in the treatment of these timbers amounted to 4.5 lb. of creosote per cubic foot.

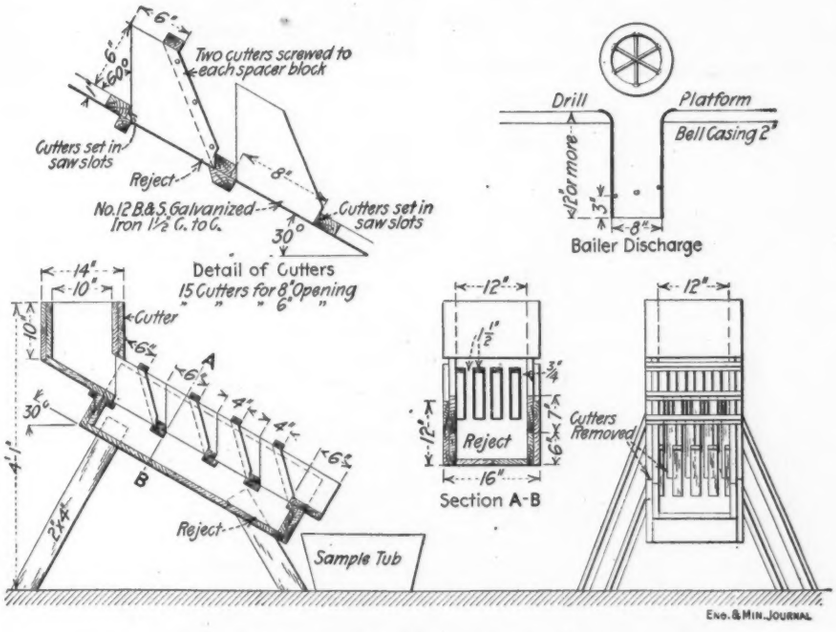


FIG. 2. DETAILS OF SAMPLE CUTTER FOR CHURN-DRILL SLUDGE

COMPARATIVE COST OF UNTREATED AND TREATED TIMBER SETS

Cost of untreated sets:	
1127 ft. b.m. squared timbers, at $20.50 per M b.m.	$25.36
Framing timbers	13.50
Lagging, at $15 per M	5.90
Switching and unloading charges	0.85
Cost of placing set	18.00
Cost of untreated set in place	$63.61
Cost of treatment:	
Treating, including interest, depreciation, fuel and labor charges	3.34
Creosote, at 15.6c. per gal	8.03
Loading and unloading charges	1.23
Total cost of treatment	$12.60
Total cost of treated set in place	$76.21

From this example it is seen that the cost of treating timbers, while a considerable item, does not, when taken in conjunction with the cost of the timber and its preparation and placement, form an unduly high proportion of the whole cost. The actual cost for other mines will, of course, differ more or less from these figures, but they serve to illustrate the relation between the cost of treated and untreated timbers.

LIFE OF TREATED AND UNTREATED TIMBERS

From various experiments carried on in coal mines the following conclusions are given:

(1) All of the untreated material failed within from one to three years, while brush-treated timber remained serviceable from three to four years.

(2) The life of untreated peeled loblolly and short-leaf pine was from 10 to 15% greater than similar unpeeled material.

(3) In dry, well-ventilated workings the average life of untreated seasoned loblolly pine was approximately 25% greater than that of similar green material. In wet places seasoned timber did not appear to outlast unseasoned material.

(4) Loblolly and short-leaf pine, brush-treated with coal-tar creosote and Avenarius carbolineum, proved to be from 50 to 100% more durable than untreated material. Moreover, brush-treated loblolly and short-leafed pine proved more serviceable than untreated long-leaf pine, pitch pine and red oak and black oak. Brush treatment with Avenarius carbolineum was somewhat more effective than similar treatment with coal-tar creosote.

(5) The condition of timber treated by the open-tank process with sodium and magnesium chloride, although not comparing favorably with that of timber similarly treated with other preservatives, was better than that of brush-treated timbers.

(6) Open-tank treatment of green timber with zinc chloride proved fairly effective, but tests indicate that better results will be secured with seasoned tim-

ber. A chart shows that 13% of the green timber treated with zinc chloride by the open-tank process showed marked signs of decay after four years, while no decay was found after the same period of service in seasoned material similarly treated.

(7) With the exceptions noted, none of the impregnated timbers showed signs of decay after from three to four years' service, although some of them had failed from crushing and squeezing.

(8) In some cases impregnated timber, re-framed after treatment, showed signs of decay. This was probably due to the cutting away of treated material and the consequent exposure of untreated portions of the timber.

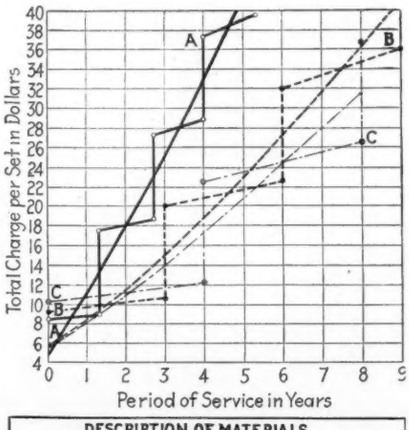
Comparative Cost

The chart reproduced herewith shows graphically the comparative cost of untreated and brush-treated loblolly pine gangway sets after various periods of service. The charge includes the cost of installation and maintenance, plus simple interest at 5% on the investment, and was derived from cost data as published in table 3 of the bulletin and the figures for average life secured from the experimental sets placed in the mines of the Philadelphia & Reading Coal & Iron Co. The broken lines show the actual expenditures for a gangway set of average life. Thus the original cost of a green unpeeled and untreated loblolly pine gangway set, including removal of old timber and placement of new ones, amounts to about $8.50. The average life of such a set is about one year and four months. At the end of this period the simple interest charge on the expenditure amounts to 57c., making a total of $9.07 up to that time, as indicated on line A. To this must be added a replacement charge of $8.50, which is indicated by the vertical rise in the line; the total charge for the two installations and the maintenance and simple interest on the first installation up to this time amounting to $17.57.

After a period of two years and eight months the interest charges on the cost of the first installation amount to $1.14 and on the first replacement to 57c., making the total cost up to that time, $18.71. A second replacement is then necessary, the cost of which is again shown by the second vertical rise in the line. Thus the increased interest charges are represented by the increase in the slope of the lines connecting the vertical rises in the broken line, while the vertical rises represent the successive replacement charges. Lines B and C, showing the cost of brush-treated sets, are derived in a similar manner. If a number of sets are considered it is unlikely that all of them will fail at the same time, and for this reason the average expenditures are better represented by the smooth curves shown in the diagram.

Summary

The results of the investigations discussed in the bulletin are summarized as follows: Decay is, in general, the agency most destructive to timber used in mines. Although decay may often be retarded by peeling and seasoning, treatment with a suitable preservative is more effective. The average life of green, unpeeled, and untreated loblolly-pine gangway sets, under the conditions of the experiments discussed, was less than one and one-half years; brush treatments with creosote and carbolineum increased this to three or four years, while impregnation treatments with zinc chloride and creosote left from 70 to 90% of the timbers sound at the end of four years.



DESCRIPTION OF MATERIALS				
Curve	Condition When Placed	Preservative Used: Sold as	Preservative Used: Amount Used	Method of Application
A ○ ———	Unpeeled Green	———	———	Untreated
B ● - - - -	Peeled Seasoned	Coal-Tar Creosote	½ Gal. per Set ½ lb. per Cu. ft.	Brush Treated 2 Coats
C ⊙ ·---·	Peeled Seasoned	Avenarius Carbolineum	½ Gal. per Set ½ lb. per Cu. ft.	Brush Treated 2 Coats

ENG. & MIN. JOURNAL

Comparative Cost of Brush-treated and Untreated Lobbolly Pine Sets

The use of treated timbers results in a saving in the cost of maintenance of workings and a reduction in the amount of timber required and makes possible the utilization of inferior species of wood.

Brush treatments are economical when the amount of timber to be treated will not warrant the erection of a small open-tank or pressure plant, or when only a short increase in service is required. The open-tank process is adapted to the treatment of small quantities of easily impregnated timber; when a large amount of timber is to be treated, a pressure plant should be used. Mine timbers impregnated with zinc chloride and creosote oils have shown the best results, up to the present no difference in their durability being noted. An efficient system of inspection and supervision in the use of timber will reduce waste and result in considerable economy.

Electric Smelting of Arsenical Copper Ore*

The following experiments were performed on an ore carrying SiO_2, 20.3%; Cu. 10.1; Fe, 27.10; Al_2O_3, 9.45; As, 9.25; Mn, 0.48; S, 15.0; Co, 0.116%; and small quantities of Bi, Ag and Au, to see what advantages electric smelting promised over the ordinary methods. The first experiments attempted to produce coarse copper by reaction smelting, for which a portion of the ore was roasted until the product showed SiO_2, 22.5%; Cu, 10.5; Fe, 34.6; Al_2O_3, 11.5; As, tr; Mn, 0.5; S, 1.5 per cent.

The first trial attempted to produce only metallic copper, using a shaft furnace, the upper electrodes being of carbon, the lower of copper. The charge melted easily, evolving large quantities of sulphurous and arsenious acid, and some metallic sulphur, and the slag was liquid. The copper electrode was too greatly corroded, however, and in the next trials the quantity of roasted ore was increased. Under these conditions the copper produced was mixed with speiss, much matte was formed, and the slag was high in copper, so the idea was given up in favor of matte smelting.

The experiments on matte smelting were carried out in a black-lead crucible. A hole was bored in the bottom through which one electrode entered, the joint being made with gas tar. The other electrode entered through the cover, and at the start a pencil of carbon was inserted between the electrodes. A pipe inserted in the side of the crucible toward the top led to a dust chamber, in which it was hoped to collect arsenious sulphide.

In this smelting no speiss was obtained. The matte carried: Cu, 21.37% Fe, 50.27, S, 28.39%. The slag was glassy and assayed 0.15% Cu. The ore smelted was 3.62 kg.; the power consumed, 9.6 kilowatts-hours; so that, as the ore carried 0.35 kg. copper, this is equivalent to 27,500 kilowatt-hours per ton of ore smelted. The matte recovered amounted to 1.6 kg., containing 0.342 kg. copper. There was 0.85 kg. of slag carrying 0.001 kg. copper, leaving the unexplained loss of copper 0.007 kg. The sublimate amounted to 0.35 kg. carrying 60% As, a saving of 65.6 per cent. Experiments were then made to find the best tenor of matte to produce, the following points being considered: cost of roasting; cost of smelting; loss of copper in slag; cost of matte and speiss treatment. The results obtained pointed to a mixture of about 60 to 70% of roasted ore, and that it was advisable to clean the slag by addition of a little raw ore after the smelting was over.

*Abstract of a paper in Metallurgie, Vol. 8, Part 19. Translation by O. H. Hahn.

Iola Cyanide Mill, Candor, N. C.

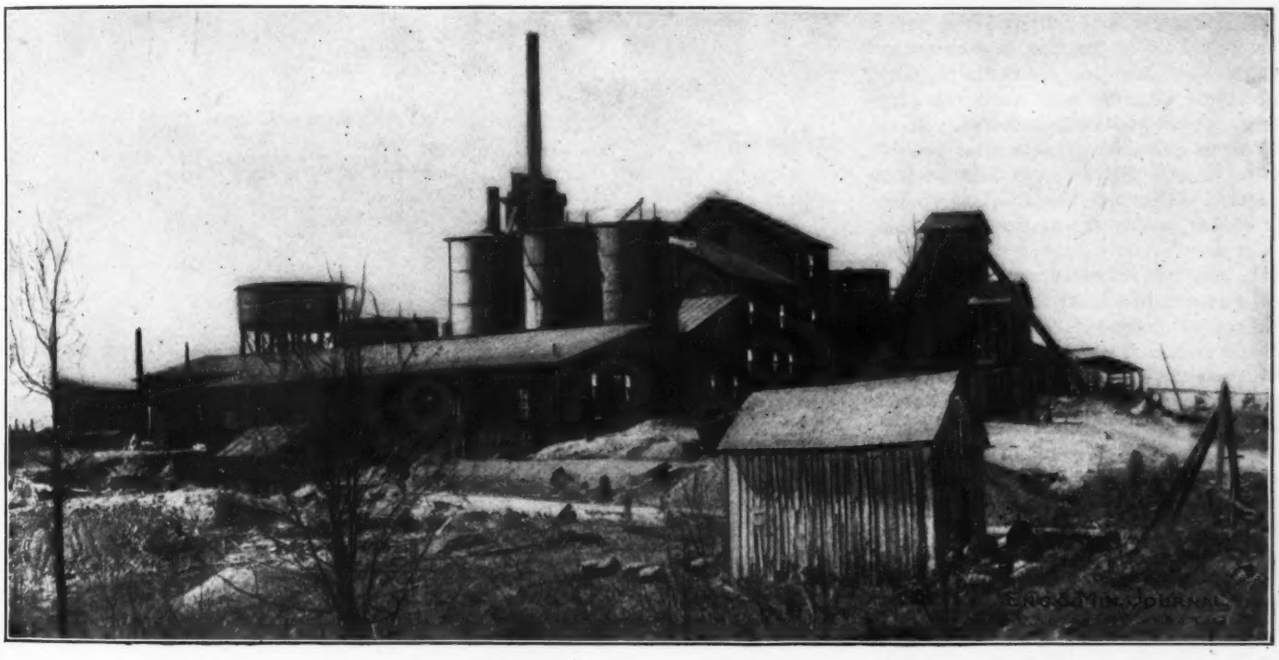
By Percy E. Barbour *

In a distinctly agricultural district in the South is found a modern, all-slime cyanide mill. It is equipped with 1750-lb. stamps, Parral agitation tanks, pressure filter and every modern accessory. The labor, however, is particularly inefficient for mining purposes.

*Manager, Uwarra Mining Co., Candor, N. C.

It is a far cry to the time when North Carolina was the first gold-producing state of the Union, yet that is a cherished boast of some North Carolinans. When, three years ago, a well known New York mining capitalist started the financing of a gold mine in this state, his friends said it sounded about as attractive as a banana plantation in Butte. The result, however, is a mine which ships between 40 and 50 lb. of gold bullion semi-monthly to the mint from a new mill, which is not only modern in every detail, including the latest types of machinery in every department, but which has the distinction of having the heaviest stamps in the United States.

Through the courtesy of William F. Mack, the manager, and Arthur B. Parsons, the superintendent, I am glad to be able to furnish some interesting details of this mill and to state the remarkably low milling costs, which would be a credit to a modern mill in a district where the labor is much more efficient than it is here in the cotton country.



IOLA CYANIDE MILL, CANDOR, MONTGOMERY COUNTY, N. C.

EARLY HISTORY

The Iola mine and mill, operated as the Candor Mines Co., are situated about three miles from Candor, Montgomery County, in the south-central part of North Carolina. The surrounding country is an agricultural one; where corn and cotton thrive and on some plantations are raised scientifically on an extensive scale; where large peach orchards ship carloads daily; where negro and white labor work together harmoniously, and almost equally inefficiently, when they are not working on the crops; and where the scarcity of labor in general is appalling.

The early history of the Iola was much like the early history of a Western mine in every way, as the variety of shafts, old stone chile mills, and other mill and mining machinery on the company's scrap heap all testify. The mine was named in honor of the lady who furnished funds for the early efforts of the project, and who bore the euphonious name of Iola Oyster. The last touch of Western realism is added to this mining district in the cotton belt by noting the small Macedonian graveyard, near the mine, said to contain nineteen killed in fair fight or murdered, which makes even Pioche look to its laurels.

ORE WASHED AND SORTED

The present mill has been in operation continuously since its completion, in August, 1911. Sixty-two tons of ore per day are hoisted and dumped from an inclined skip over a 1¼-in. grizzly at the top of the headframe. The undersize drops to a bin in the lower portion of the headframe structure. The oversize is washed on a picking floor at the foot of the grizzly by negroes who learn to do it so dextrously, with buckets of water as the ore falls from the skip, that no delay is occasioned and the rock is cleaned so that about six tons of waste can be picked out by hand. The ore is then crushed to 1¼ in. in a 15x9-in. Blake crusher. The crushed ore drops into the bin with the undersize through the grizzly, from which bin it feeds to an 18-in. belt conveyor. This conveyor belt, 80 ft. long on centers, and inclined 22°, is also the picking belt. At the lower end, a fine water spray cleans the ore again and enables the pickers, seated along the belt, to pick out about six tons more of the slate. The elevator discharges into a 100-ton flat bottomed bin. Thus to get 50 tons of ore into the mill bin, 62 tons are hoisted from the mine. As a matter of fact, if there were sufficient reliable labor, five tons more waste could be picked from the 50 tons which are now fed to the stamps through suspended Challenge feeders.

Underground sorting is unsatisfactory for several reasons. The vein is narrow, averaging about 24 in. and is frozen to both walls, which are greenish-gray slate. The mine is very wet and the ore is so muddy that it is impossible to sort it satisfactorily underground, and owing to the pieces of slate being frozen to the quartz,

crushing has to be done before the final sorting, which latter has to be under the eye of the mill boss or the waste becomes low-grade ore.

There are two kinds of ore treated, which require radically different treatment of themselves, but cannot be mined and treated separately under local conditions and therefore have to be mixed just as they come from the stopes. The ore from the upper levels is oxidized and the accompanying waste is a soft clayey brown slate. In the lower levels the ore is a very tough hard clay quartz with a pearly luster, and the country rock to which the vein is frozen is a tough gray slate. The unavoidable mixing of this ore as it happens to come out of the mine complicates the treatment problem, and more, also, the purely mechanical manipulation of the machinery adjustments.

The 1750-lb. Stamps Crush from 10 to 12 Tons per Day

The battery has five 1750-lb. Allis-Chalmers stamps which have a 7 to 7½-in. drop and make 107 drops per minute. The weight of the stamps is distributed as follows: Stem, 4 in. x 15 ft., 635 lb.; tappet, 215 lb., boss head, 650 lb.; shoes, 9¼x14 in., 250 lb. The cam shaft is 7 in. in diameter. The mortar box is of the narrow El Oro type and weighs 10,500 lb. The boss heads extend above the mortar, which has no housing above the screen frame.

The original set of chrome-steel shoes and dies crushed 4000 tons of ore. A new set of chrome-steel shoes was put on, and dies, cast at a local foundry from a mixture of old chrome-steel dies and common pig iron, were used. These dies were hard enough but were brittle and did not wear out the new set of shoes and were replaced with all cast-iron dies, also cast locally. The second set of shoes now being worn out is being replaced, and the cast-iron dies, while not worn out, are being replaced with a set of chrome steel, as at first used. The cost per pound of locally made dies was considerably less, but the cost per ton of ore crushed was approximately the same as when the chrome steel was used.

The battery screen originally used was 4-mesh. This screen was found to be entirely too coarse for the capacity of the 4x20-ft. tube mill, and a Tyler "ton-cap" equivalent to 8-mesh went to the other extreme and failed to load the mill to capacity. At present a double-crimped Tyler screen, with openings one-sixth of an inch, wire 0.120-in. diameter, is being used. The ratio of solution to ore is approximately 6:1. Under these conditions the capacity of the stamps per 24 hr. when crushing hard ore alone averages 10.5 tons, which is rather low for such heavy stamps. The extremely tough character of the ore is the only explanation. During the month of June, just passed, when 15% of the ore came from the upper workings of the mine, the duty increased to 11.9 tons. While the mine does not produce in excess of the capacity of the mill, 50 tons, and there is accordingly no necessity for increased capacity at the present time, there is no doubt that a 5x22-ft. tube mill, allowing a 4-mesh battery screen, a larger solution ratio, and closer feeding, would make possible a stamp duty of 15 to 16 tons, and would result in more economical operation.

Battery Construction

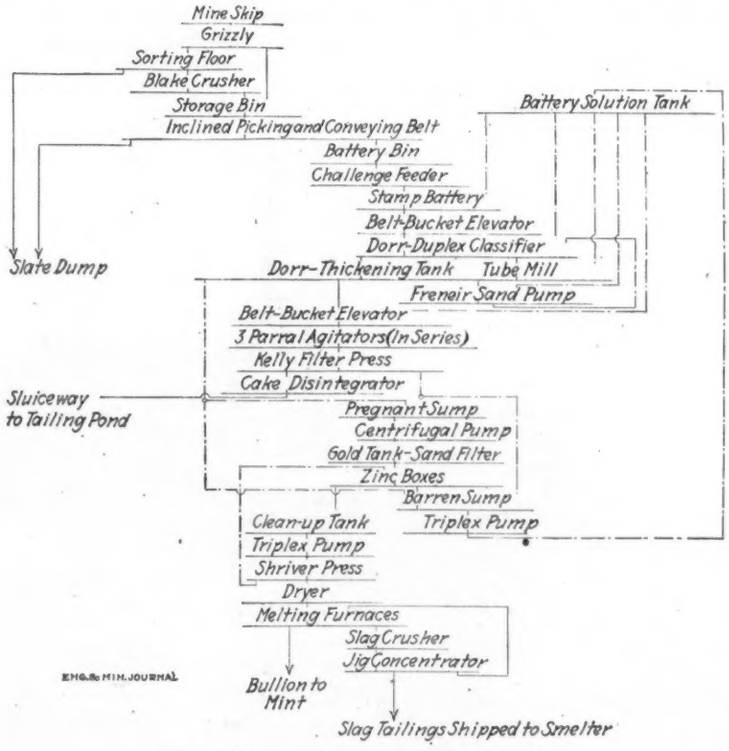
The mortar block is a concrete monolith reinforced with steel rods. It has a tunnel through it into which all holding-down bolts extend; the latter can, therefore, be replaced if necessary without moving the mortar box. There are eight 2-in. bolts for the mortar box and eight of the same size for the shoes for the battery posts. The cross-section of the mortar block is unusual and would seem to be weak structurally at the foot of the batter across the short dimension to the bolt tunnel, but the block has stood a year's pounding of the heavy stamps, which seems to allay criticism. The concrete mixture for the block was 1-2-4. A rubber pad, ¼ in. thick, is used between the block and the base of the mortar box.

At the end of 11 months' operation not a single stem nor tappet nor boss head had been broken. The only breakage about the battery was a 7-in. camshaft, which gave out after eight months' use, due chiefly to a flaw in the material. One cam was broken in removing it from the shaft, but other than this no cams have been broken. A scheme is being tried to damp the vibration of the free end of the camshaft by means of a lever of oak bearing upon the shaft with the free end held down by means of an old spiral crusher-spring. This does away with most of the vibration, and is expected to increase the life of the shaft, as well as the bearings and the battery posts.

Regrinding the Battery Pulp

The strength of the mill solution averages 1.3 lb. KCN per ton and the protective alkalinity is 0.6 lb. per ton, in terms of CaO. The battery pulp is elevated by a 12-in. bucket elevator, with special extra-heavy grit-proof bearings, designed by Bernard MacDonald, to a standard double-rake Dorr classifier. Owing to the hard and tough character of this ore, the slime is always granular, even when it passes 200 mesh (it is never colloidal), and it settles quickly and compactly. Therefore it has been found necessary, in order to obtain a comparatively clean sand for the tube-mill feed, to supplement the spray pipes in the bottom of the classifier with an additional pipe put in above the rakes. The Dorr-classifier overflow goes to a Dorr thickener and the classifier discharge drops directly into the feed hopper of a spirally fed 4x20-ft. Allis-Chalmers tube mill.

The tube-mill lining is of the Montana Tonopah cast-iron ribbed type. The first set of liners at the head end wore entirely through in eight months, which gives an idea of the abrasive character



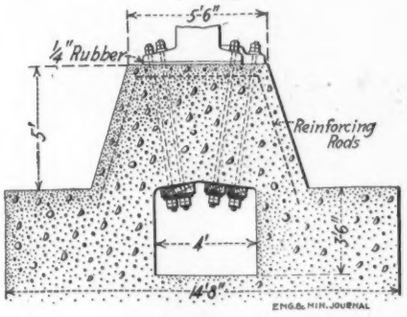
Flow Sheet of Iola Mill, Candor, N. C.

of the ore. This mill makes 31 r.p.m. The best Danish pebbles are used which cost between $18 and $19 per ton at the mill. The pebble consumption for the first four months of this year averaged 3.45 lb. per ton of ore crushed. The sand from the Dorr classifier contains 29% solution and 10 to 11% more is added to give the tube-mill pulp 39 to 40% moisture.

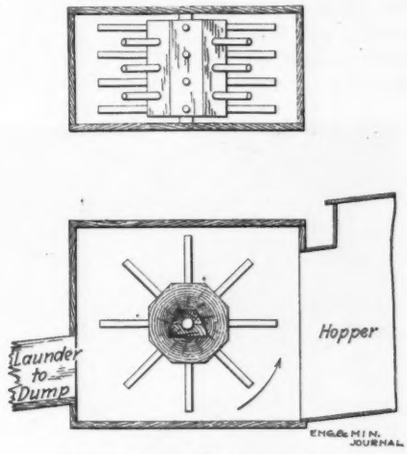
The tube-mill product is returned to the Dorr classifier by a 6x48-in. Frenier sand pump operating against a vertical head of 12 ft. The pump to date has run without any trouble and without any repairs other than the renewal of a pinion and a packing joint.

Treatment of the Pulp

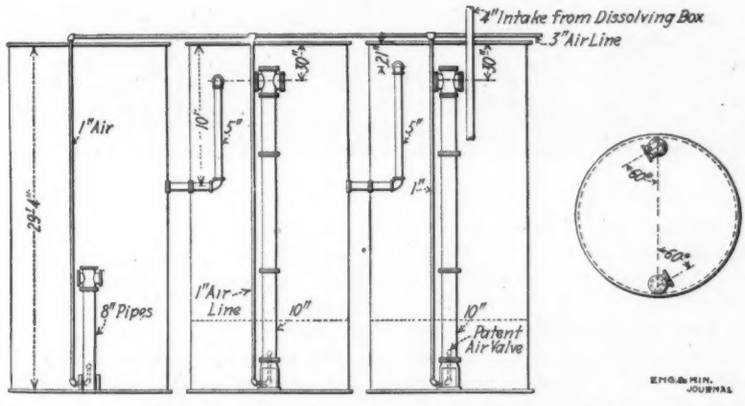
The overflow from the classifier goes to a steel tank, 18 ft. diameter by 8 ft. deep, equipped with a Dorr continuous thickener. This thickener is not allowed to discharge continuously but is drawn off at intervals of 30 min. Then only the thick pulp is withdrawn, fresh circulating solution being added to bring the specific gravity down to about 1.38, the most satisfactory consistence of pulp for agitation here. The pulp discharges through a 12-mesh screen-bottomed tray into a boot of a second bucket elevator. This screen catches nearly a bushel basket full of fragments of wood, which get into the ore in spite of the ore pickers, who should remove such material. This second elevator, similar to the first, carries the pulp to the top of the No. 1 Parral tank. At the boot of the elevator additional lime is added in the form of an emulsion at the rate of 0.5 to 2 lb. per ton, depending upon whether the ore comes from the bottom of the mine or the softer oxidized workings nearer the top. This pulp is discharged into the first Parral tank through a cone, made from an old cone classifier, which has a pipe extending 5 ft. below the surface of the contents of the tank. This is done to make the fresh pulp go into the cycle and to prevent any chance of short-circuiting. Fresh cyanide is introduced into the system at this point, being placed on a screen in the bottom of the cone where it is dissolved by the pulp splashing over it. The cyanide is added every four hours at the rate of about 0.5 lb. per ton of dry slime.



Concrete Mortar Block



Filter-cake Disintegrator



Arrangement of Parral Tanks at Iola Mill

There are three steel Parral tanks, each 13 ft. diameter by 29 ft. high, with a capacity of 55 tons of dry slime in pulp of the average consistence. The first two tanks are arranged for continuous agitation and the pulp therefore gets an agitation treatment of more than 48 hr. before it goes into the third tank, which was originally a Parral but which has since been changed. The air-lift pipe in this third tank has been cut off one-third the way up from the bottom because this tank acts as a storage tank for the slime filter, which runs only during the day shift, being full in the morning and below the top of the air-lift pipe at night. The pulp, therefore, gets further agitation in this tank, making the total time of agitation equivalent to about 52 hr. However, 90% of the total extraction takes place in the first tank. These Parral tanks are the usual type with the two air lifts near the circumference of the tank with their discharges pointed away from the diameter; the accompanying engraving shows the details of the various connections together with sundry dimensions. These tanks each have a false bottom, shaped like a peaked roof, made of wood. They are arranged so that either can be cut out and the contents filtered.

A third Parral tank, which serves the dual purpose of an agitation and a storage tank went through an interesting change from its original form. Inasmuch as the filter is operated only during the day shift, this storage tank is during the night accumulating the slimes crushed during that shift and is slowly filling; the reverse takes place during the day when the tank is being slowly emptied. Originally the tank was equipped with two air-lift pipes, similar to those in the other two tanks, except that the top tee was only about one-third the way up the tank. The discharge pipe to the filter was in the center of the bottom of the tank, so that no false bottom could be put in. The result was that the sand packed around this discharge and caused much trouble in keeping the pipe line to the filter open. To obviate this, one of the lift pipes was put over the center of the tank and the other lift pipe disconnected, with results which justified making this arrangement permanent. The slime has naturally packed high along the circumference of the tank, and, sloping downward toward the center, has built up a nearly perfect inverted conical bottom, so that to all intents and purposes it is now operating as a Pachuca tank. One would hardly look in the field of agitation tanks for an exposition of a Darwinian theory, but this seems to be clearly an example of "reversion to type."

Kelly Filter Used

The separation of the slime and pregnant solution is effected in a Kelly pressure filter, size No. 1 B, which easily handles the total tonnage in less than 12 hr. The cycle of operation is: Filling press, 2 min.; forming cake, 3 to 6 min., depending upon condition of leaves; returning excess pulp, 2 min.; filling with wash pulp, 2 min.; filling with wash water, 2 min.; Washing, 1½ to 3 min.; returning wash and drying, 3 min.; discharging, 12 min.; total length of cycle, 25 to 30 minutes.

The filter treats 2.2 tons per charge. The dissolved gold in the tailing varies from 2 to 15c. and averages about 7c.

per ton. A solution wash was tried, but the additional time and labor required did not justify the slight additional saving of dissolved gold, so that water is the only wash used at present. The tailing discharged from the filter leaves contains about 20% moisture.

Disintegration of Filter Cake

Built, as found necessary with this plant, on almost level ground, the problem of disposing of the tailing gave some trouble. There is a fair supply of water available, but not enough to carry the tailing through the long wooden launders with only a slight grade until the tough cake is completely broken up. At first this breaking up was accomplished by a real "down South hoeing nigger," who worked in the hopper with a hoe, but this was an unsatisfactory combination. A cake disintegrator was devised, consisting of an oak log stuck full of wooden pegs arranged at right angles to the flow of the tailing and revolved 70 times per min. by belt and pulley. This disintegrator is at the very mouth of the discharge hopper and revolves so that the pegs tend to lift the cake up and carry it over the top of the log. The disintegrator is housed in to prevent splashing. It is an extremely simple, almost crude device, but it works perfectly and saves the labor of one man per day with an inconsiderable expenditure of power. Since the installation of this device the work of sluicing has fallen to the solution man, who is able with a fire hose and a good head of water to discharge the cake from the filter leaves in three to four minutes, the disintegrator doing the rest. The total water used in flushing away this tailing is about two tons per ton of dry slime.

Every 20 to 25 days the filter leaves are washed in a 0.5% HCl solution. They are not treated in the filter drum as the Kelly company recommends, but are put in a vat and the solution is forced through them in the same direction as the water, which forces the cake off the leaves. This treatment continues 24 hr. Another reason the leaves are treated outside the filter drum is because a good scrubbing has been found to put the leaves in much better condition for being returned to service. Duplicate sets are kept on hand and it takes less than an hour to change a set.

The pulp and the wash water are handled wholly by montejus, no pumps with moving parts being employed in connection with the filter. The mill which antedated this one, which was burned, had a revolving-drum continuous vacuum filter, but the results were unsatisfactory, due to the fact that the ore makes no colloidal slimes. As before stated, when ground to 200 mesh, the product is all distinctly granular, and this product not only did not make a good cake despite all efforts, but owing to the rapid settling of the granular slimes the tank in which the drum revolved would build up with this settled slime, so that every week it was necessary to shut down and sluice out this tank and lose the entire contents. Several air jets for agitating the pulp in the tank were tried without overcoming the difficulty. The management point to this as a striking example of the superiority of the pressure filter over the vacuum filter for this particular ore.

Precipitation by Zinc Shavings

The pregnant solution from the filtered slime goes to a gold tank, from which it is pumped to a clarifying tank, which has a filter bottom made of wooden slats supporting cocoa matting, the space between the slats being filled with gravel containing pebbles not over ½-in. diameter. On the cocoa matting is 3 in. of fine sand. The top of this sand layer has to be cleaned off every two weeks and the entire layer renewed every two months. The solution is handled to this tank by a 4-in. Morris centrifugal pump.

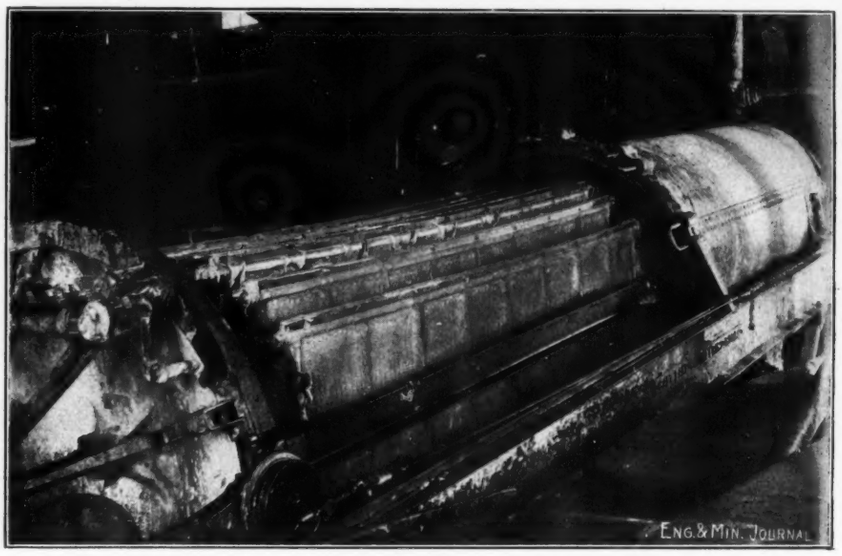
From the gold-filter tank the solution flows by gravity to three 6-compartment zinc boxes, 24x36x20 in. Only four compartments of the six are packed. The zinc shavings, cut at the mill in an ordinary zinc lathe, grade 250 per in., and are made up into skeins 2 ft. long and as large around as a man's arm. These skeins are laid in the boxes with alternating layers crossing each other cob-work fashion.

Semimonthly Cleanup

Cleanups are made twice per month, during which the small quantity of short zinc is treated with sulphuric acid, this procedure resulting in a cleaner bullion by excluding a portion of the zinc. The precipitate which passes a 30-mesh screen goes to a clean-up tank and is pumped by a Deane 2x3-in. triplex pump to an 18x18-in. Shriver filter press. The acid-treated material is put through the press separately. The entire precipitate is then mixed, dried and melted down in an iron-muffle furnace, using coke for fuel. The flux used consists of 25 parts borax, 15 soda, 15 sand and 7 each of niter and slag. The slag from the melting is crushed, hand-jigged and shipped to the smelter. The bullion assays 718 fine in gold and 225 in silver, and is shipped either to the U. S. Assay Office, at Charlotte, or to the mint at Philadelphia.

Cost of Operation

The labor in this section is a source of great annoyance, due to the irregularity of attendance of employees, which also makes for inefficiency. The labor required to operate this mill consists of one millman at $2.50, one solution man at $1.85, one mill helper at $1.65, on each of the two 12-hour shifts, and one filter man at $2 on the day shift only. These men operate and keep up all mill repairs, making the total labor cost $14 per day.



Kelly Filter in Discharging Position—Iola Mill, Candor, N. C.

The treatment cost per ton of ore is $1.64, divided as shown in the table.

TREATMENT COSTS AT IOLA MILL

	Per ton ore milled
Milling	
Power	$0.577
Crushing and conveying	0.129
Stamping	0.061
Elevating	0.038
Classifying and thickening	0.048
Tube milling	0.041
Mill engine	0.015
General charges	0.096
Total milling	$1.005
Cyaniding	
Power	$0.115
Cyaniding	0.190
Precipitating and refining	0.081
Filtering	0.085
Assaying	0.095
General charges	0.069
Total cyaniding	$0.635
Total milling and cyaniding	$1.64

The mill heads averaged for a three months' period $12.921 per ton, and the

tailing $0.552 per ton, showing an extraction of 95.7%. The consumption of chemicals and pebbles for four months of this year is shown in the table.

CONSUMPTION OF MATERIAL

	Lb. per ton ore milled
Cyanide	$0.5487
Zinc	0.4600
Lime	3.7425
Pebbles	3.4500

A flow sheet of the mill operation and a general view of the installation are shown in the accompanying illustrations.

New Colorado Smelting Schedules

SPECIAL CORRESPONDENCE

The new smelting schedules, covering Clear Creek, Gilpin and Boulder counties, appear to be more favorable to the shipper than the older, particularly on lead ores and concentrates. The working charge has been reduced $1 per ton on ores and concentrates up to 30% lead, the deduction from the copper quotation has been reduced one cent, and the sampling charge has been eliminated on lots of over 7 tons. The following schedule is f.o.b. cars, Denver, on carload lots.

LEAD ORE SCHEDULE

Payments will be made for gold over 0.05 oz. per ton at $19.50 per oz.; silver on 95% of assay at New York price; lead prices are based on $4 lead, as explained below; copper, deduct 1.5 units from wet assay, and pay at Western Union quotation for casting copper less 6c. Zinc over 10% is penalized at 50c. per unit. On the so-called neutral basis, the payments for lead and the working charges are given below, the working charge be-

PAYMENTS ON FLAT SCHEDULE

Lead %	Pay Per Unit	Working Charge
5 to 10	40c.	$10.00
10 to 15	43c.	8.50
15 to 20	45c.	7.00
20 to 25	47c.	5.50
25 to 30	49c.	4.50
30 to 35	51c.	3.50
35 to 40	52c.	2.00
40 to 45	52c.	1.00
45 to 50	53c.	1.00
50 to 55	54c.	1.00
Over 55	55c.	1.00

ing 10c. up or down from the neutral basis. The "flat" schedule is also given, and either the neutral or flat schedule is used, as is best for the shipper.

LEAD CONCENTRATE SCHEDULE

Gold is paid for at $19 per oz. when from 0.05 to 2.0 oz. per ton, and at $19.50 when over 2.0 oz. per ton. Silver and copper are paid for as in lead ores: Lead prices are based on $4 lead. Silica is penalized at 10c. per unit over 10%. Zinc is penalized at 50c. per unit over 10%. On lead from 5 to 10%, pay at 40c. per unit, $3.75 working charge; from 10 to 15%, 43c. per unit, $3 working charge; 15 to 20%, 45c. per unit, $2.50 working charge; 20 to 25%, 47c. per unit, $2.25 working charge; 25 to 30%, 49c. per unit, $2.25 working charge. Upon concentrates assaying over 30% lead, apply either the neutral or flat schedule, whichever figures better for the shipper, except pay for gold as provided under lead concentrates.

The prices paid per unit of lead in all ores and concentrates are based upon a

PAYMENTS ON NEUTRAL BASIS

Lead %	Pay Per Unit	Working Charge
5 to 10	40c.	$6.00
10 to 15	43c.	5.00
15 to 20	45c.	4.00
20 to 25	47c.	3.00
25 to 30	49c.	3.00
30 to 35	51c.	2.00
35 to 40	52c.	1.50
40 to 45	53c.	1.00
45 to 50	53c.	1.00
50 to 55	54c.	1.00
Over 55	55c.	1.00

quotation of $4 per cwt., for lead, and vary one cent up or down for a change of 5c. in the quotation used as a base of settlement. This quotation is figured as follows from the New York sales price on the date of settlement. When the sales price does not exceed $4 per cwt., take 90% of the sales price. When it does exceed $4, add to $3.60 per cwt. one-half of the excess of the New York price over $4.

GENERAL ORE SCHEDULE

On carload lots, f.o.b. Denver, the general schedule is as follows: Gold, $19 per oz. from 0.05 to 2.0 oz. per ton; $19.50 if over 2.0 oz. per ton. Dry copper (wet assay less 1.5%) up to 5% dry assay, is paid for at Western Union quotation for casting copper less 6c. For copper from 5 to 10% dry assay, deduct 5c.; over 10% dry, deduct 4c. Zinc over 10% is penalized at 50c. per unit. On ore of $14 gross value or under, the treatment charge is $5; $14 to $20 gross, $6 treatment; $20 to $25, $6.50; $25 to $30, $7; $30 to $35, $7.50; $35 to $40, $8; $40 to $45, $8.50; $45 to $50, $9; over $50, $10. Lead, 5% or over, is paid at 25c. per unit, but either the flat or neutral lead-ore schedule is applied to lead ore if better for the shipper. On dry ores, if better for the shipper than the above flat schedule, apply $7 treatment charge, neutral basis, 10c. up or down.

On dry concentrates: Gold, silver, and copper are paid for above. Silica over 10% is penalized at 10c. per unit; zinc over 5% at 30c. On concentrates of $35 gross value or under, there is $3.50 treatment charge; from $35 to $80, $4 treatment; over $80, $4.50 treatment. The maximum treatment charge upon concentrates, including the silica but not the zinc penalty, shall not exceed the maximum charge upon crude ores of the same grade.

July Operations at Goldfield Consolidated

During July, 1912, the total production of the Goldfield Consolidated Mines Co., according to the official reports, was 31,907 tons, containing gold worth $474,956, or an average of $14.89 per ton, of which 29,000 tons was milled with an average extraction of 91.05% and 2907 tons was shipped of an average value of $16.42 per ton, the net recovery from all ore being $13.69 per ton. The total net realization to the company was $238,279, or $7.47 per ton. The total cost of mining, development, transportation, milling, office and general expense was $6.41 per ton, distributed as shown in the accompanying table.

During July, 2923 ft. of development work was done. In regard to the month's work, J. F. Thorn, general superintendent for the company, remarks as follows:

At the Combination, the 402-G stope, 300 ft. north of the shaft between the fifth and sixth levels, produced 399 tons of $30 ore, this being the deepest point in the mine at which ore has been found. A new stope on the second level, 80 ft. east of the 136 stope, produced 275 tons of average $17 ore.

GOLDFIELD CONSOLIDATED OPERATING COSTS FOR JULY, 1912

Mining, including stoping and developing	$3.18
Transportation	0.08
Milling	1.97
Marketing	0.05
General expenses	0.40
Bullion tax	0.05
Marketing ore shipped	0.66
Construction	0.07
Total cost of operation	$6.46
Miscellaneous earnings	0.05
Net cost per ton	$6.41

At the Mohawk, the 3-J sill, north of the 3-E stope in the old Sheets-Ish workings, produced 279 tons of $28 ore. The 170-J stope, on the 250-ft. level, or the downward extension of the old Sheets-Ish stope, produced 69 tons of $58 ore. The 202 stope, which is being carried through the old Frances-Mohawk workings, produced 68 tons of $40 ore. A new raise at the south end of the 348 stope, between the 450- and 350-ft. levels, has encountered ore assaying $40 per ton. An important development was made on the intermediate level, between the 450- and 600-ft. levels, about 700 ft. north of the shaft. The 426 crosscut penetrated ore, and the 490-I sill, which is being cut in the ore, produced 755 tons of $40 ore.

At the Clermont, the 571 drift on the downward extension of the 510 orebody, between the 750- and 900-ft. levels, produced 55 tons of $40 ore. In the Grizzly Bear, 250 tons of ore, averaging $30 per ton, was shipped from development work on the 1300-ft. level. Work on this level has been done rather slowly, on account of being carried on in conjunction with sinking the shaft. When the 1400-ft. level of the shaft is reached, lateral work from both levels can be carried on more rapidly.

Petroleum Industry in the United States

Since the beginning of the oil industry in the United States over two and a half billion barrels have been produced, according to the U. S. Geological Survey, and the total value of the oil, reckoned in the crudest condition at the mouth of the well, is over two billion dollars. More than half of this oil has come from New York, Pennsylvania, West Virginia and Ohio, and all has been produced in two years over half a century. In the first half of this period nearly the entire product came from the eastern fields, but lately the declining production of the eastern states has been more than compensated by the enormous output in the West, so that of the total product of the United States 972,429,805 bbl. have been produced west of Mississippi River, and at this time the Midcontinent and California fields are the controlling influences in the oil production of this country. If a line is drawn across Ohio separating its eastern oil areas from the Lima area and the Lima oils are included in the western production then the West already exceeds the East in the total produced.

The annual report of the U. S. Geological Survey on the production of petroleum, compiled by David T. Day, shows that for 1911 California not only led in quantity of product (over 80,000,000 bbl.), but produced almost half as much again as Oklahoma, the state second in rank. The Mid-Continent field omitted, California produced as much oil as the rest of the United States put together; the United States being omitted, California produced more oil than any entire nation; and if Russia and the United States are omitted, California far surpassed the combined production of all the rest of the world, including Mexico, India, Roumania, Galicia, Japan and South America.

In point of production by states, California, Oklahoma and Illinois form a class by themselves, the lowest (Illinois) producing over 30,000,000 bbl. and the three furnishing three-fourths of the entire output.

The second group includes Louisiana, West Virginia, Texas, Ohio, and Pennsylvania, in which Louisiana furnished a surprise by yielding the greatest product on record for that state (over 10,000,000 bbl.) and passing to the head of this group, while the slight gain from two pools in Texas put that state in advance of Ohio again.

In the third group, which comprises Indiana, Kansas, New York, Kentucky, Colorado, Wyoming, Missouri, Utah and Michigan, the largest state production is less than a fourth of the lowest in the second group, and combined these states produced less than 2.2% of the total.

Drill-Rigging Contest at Calumet, Mich.

CALUMET CORRESPONDENCE

A drill contest was held at Calumet, Mich., on Aug. 24, 1912, which was a novelty in its conception. It was a rigging-up contest divided into two classes, viz: Two men setting up a Rand 3-B machine; the other one man with a C-113 Butterfly. The object was to show the relative efficiency in handling the two types of machines. Each machine was run for a period of two minutes, but the depth of the hole was not taken into consideration, as this was done only for the purpose of demonstrating that the machine was rigidly and properly set up.

There were three prizes for each class of $100, $50 and $25, donated by the Ingersoll-Rand company. The Calumet & Hecla Mining Co. built the framework, there being two constructions. These frames were built to accommodate two drills each, this being done to facilitate the handling of the 38 entries.

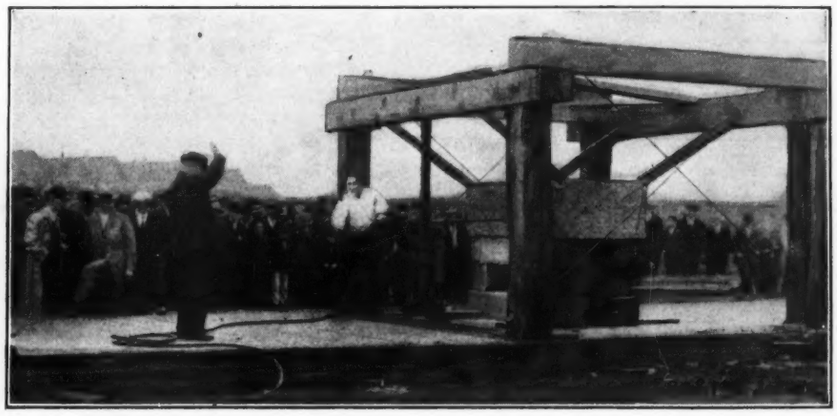
Two teams of the same class contested simultaneously at different frames and during this time the other two drills that had been used on the opposite side of the sets were being dismantled and arranged for the next team of the other class. Compressed air for the operation of the drills was furnished from the Calumet & Hecla main compressor plant through a small booster and delivered to the drills at about 85-lb. pressure.

The following rules governed the contest: Only one entry was accepted for each contest from each mine; complete outfits were placed 10 ft. from the place of rigging; nuts on clamp and arm were even with the bolt at the start; the use of one standard wrench was allowed; a 50-ft. length of hose was coiled with one end connected to the air supply; both chuck bolts were tightened; jack screws were flush with the bottom of jack at the start, and the collar stationary on the post; each contestant was required to rig up, turn on full air, and run his drill for two minutes, change steel at the finish and tighten both chuck bolts; machines, drill steel, hose and complete equipment were furnished; the drilling was on flat dry holes.

RESULTS OF DRILL CONTEST AT CALUMET, MICH.

Time				Representing Mine
Rigging	Drilling	Changing steel	Total	
min. sec.	min.	sec.	min. sec.	
Two-man teams				
1 – 32	2	10	3 – 42	Ahmeek
1 – 33⅜	2	10⅛	3 – 43⅜	Calumet & Hecla-Amygdaloid
1 – 32	2	15	3 – 47	Wolverine.
One-man teams				
2 – 21	2	12⅜	4 – 33⅜	Calumet & Hecla-Amygdaloid
2 – 26	2	16½	4 – 42½	Allouez
2 – 28	2	17	4 – 45	Wolverine

Another interesting feature in connection with the above contest was a contest between the hammer and drill team that won the match held in conjunction with the Calumet & Hecla miners' picnic two weeks previous, and an operator with a Rand-Ingersoll B-C-23 hand hammer tool.



ARRANGEMENT FOR DRILL-RIGGING CONTEST AT CALUMET, MICH.

The conditions governing the match were that each should have 15 min. actual drilling in a "Cape Ann" granite block. The hammer and drill team succeeded in making a hole 49 in. deep, using a 1¼-in. bit to start and finishing with a ¾-in. bit. The operator with the hand-hammer tool went through the block, a depth of 60 in. in 14 min. and used five different bits, starting with a 2-in. bit and finishing with a 1⅛-in. bit.

The property of the Western Steel Corporation at Irondale, Wash., has been acquired by the recently incorporated Occidental Steel Co. of Maine. The plant contains three 22-ton basic open-hearth steel furnaces, the first operated on the Pacific Coast. These were started in 1910, but have been idle for some time.

Caving System in Chisholm District—II

By L. D. Davenport*

Two methods of stoping are followed in the mines of the Minnesota iron ranges, slicing and square-set work. Slicing consists of driving a number of parallel and adjacent timbered drifts across the pillar to be mined. The details of the method are described in this article.

*Assistant chief engineer, Oliver Iron Mining Co., Chisholm division, Chisholm, Minn.

There are two systems of stoping used in the Chisholm district of Minnesota; drift slicing and square-set work. Slicing is the driving of a number of parallel and adjacent timbered drifts across the pillar to be mined, leaving only the posts between, and making them of sufficient height to take all of the ore. A slice set consists of a 7-ft. cap and two posts the length of which ranges from 2 to 18 ft., according to the height of the ore to be mined. The most convenient and economical height for a slice is 11 ft., that is, using 10-ft. posts.

Test Raises Put Up Before Slicing

When as described in the first instalment[1] of this article the slice drifts had been driven from the raises at the tramming level to the property line of the Nels mine, or to the shore line, stoping was started.

Let us consider the drift north from No. 3 raise, which struck the shore at about 1025 ft. north. Before slicing was started, test raises (3x3 ft.) were put up at 50-ft. intervals, starting at No. 3 raise. These raises, Fig. 1, were put up to the surface to determine the height of the ore above this sub-level. Having found the ore to be less than 11 ft. for the last 100 ft. of drift, slicing was started.

Dropping back from the breast of the drift to the point Z where the ore was about seven feet high, a crosscut was driven 40 ft. east and 10 ft. west from the center of the slice drift taking the full height of the ore, and the south side was boarded up with No. 5 boards as shown in Fig. 2. This crosscut is sometimes timbered with open sets, that is, the caps are placed parallel to the crosscut, instead of regular drift sets, as shown in the sketch. It is better to use open sets since slices can be started from the crosscut, without changing any of the timber in the crosscut, as is necessary when the regular drift sets are used.

Then, starting at the end of the 40 ft. crosscut, the first slice was run north over the rock until the ore was so thin that it was not practical to advance farther.

In some cases, posts less than 2 ft. in height have been used in the last set. The track is put in the crosscut, and sometimes if the rock does not rise too rapidly, the track is extended into the first slice.

Frequently, when the rock rises several feet on the north side of the crosscut, the miners use a wheelbarrow to fill the car. This is not possible, however, unless the back rises as fast as the bottom rock, so as to give the men headroom.

[1]Eng .and Min. Journ., Sept. 7, 1912.

Easier to Slice Perpendicular to Slope of Rock

The reason for driving the crosscut first, and then slicing from it, instead of starting to slice directly from the drift is, that it is easier and quicker to slice perpendicular to the slope of the rock. The posts in each set will be nearly of the same length, and it is easier to handle the ore down a direct slope. Again, sometimes, the first slice at the end of the 40-ft. crosscut extends 30 or 40 ft. farther north than the breast of the slice drift, and it would be difficult to hold a room open long enough to take out this ore had slicing been started from the slice drift. Using the method described, should the first two or three slices get heavy, the crosscut can be breasted up and the first slices boarded up, and then blasted down.

In starting the first room against caved ground, an open set is put in the drift against the caves with the caps parallel to the drift. Both the caps and the posts are spragged as shown at *A* in Fig. 3. Fig 4 shows the general method of blasting a set. After the first two holes are blasted, the upper half of the breast is squared up, and hitches are cut for the posts before the bottom is blasted. This saves building a staging for the men to stand on. A hitch is then cut in the top of the breast, and the end of a pole put into it with the other end resting on the cap of the last set. Short boards are placed on top of the pole, which is then wedged up tight against the boards. This pole, sometimes two or three are used, and the short boards secure the back, while the bottom half of the breast is taken up as shown in Fig. 3B.

The slice is continued along the caved ground across the pillar, usually about 40 ft. If the next pillar has been mined out, that is, if the slice is to strike end caves at 40 ft., it is the usual practice to leave a small pillar of one or two feet to hold back the sand as shown at *X*, Fig. 3. The track is turned into the first slice.

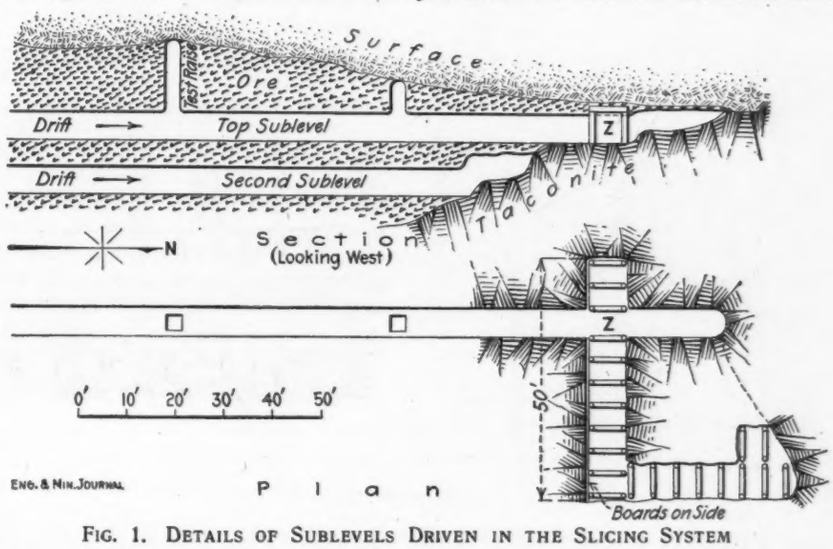


FIG. 1. DETAILS OF SUBLEVELS DRIVEN IN THE SLICING SYSTEM

Method of Starting Second Slice

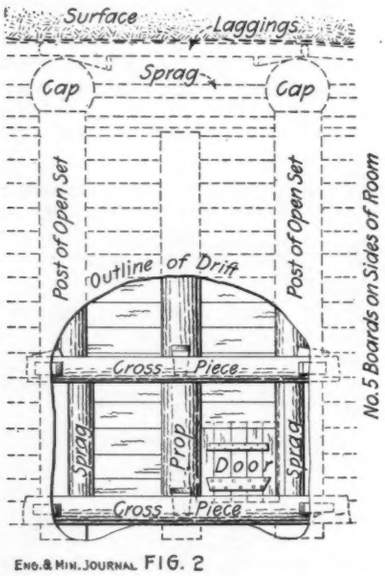
Dropping back to the second or third set, as for instance set *B*, Fig. 3, from the end of the slice a second slice is started and continued to the end caves, the bottom of the last set is covered with boards and a small pillar *X* is taken out, since, if a little sand runs into the end of the room at this time, it will do no harm. This second slice is then worked back toward the drift, leaving only the ground at *C* between the end of the second slice and the drift as shown in Fig. 3. This pillar *C* serves as a protection to the men while they are working on the other side of the drift. The solid side of the second slice is then boarded.

Next, a second open set is put in the drift against *A* set and the four sets, *a-a-a-a* on the farther side of the drift are taken out and boarded up. A set is then put in at *C*, the room is cleaned out and if there is ore on the bottom, it is covered with a single layer of No. 5 boards. The drift is then breasted up, and the room blasted down.

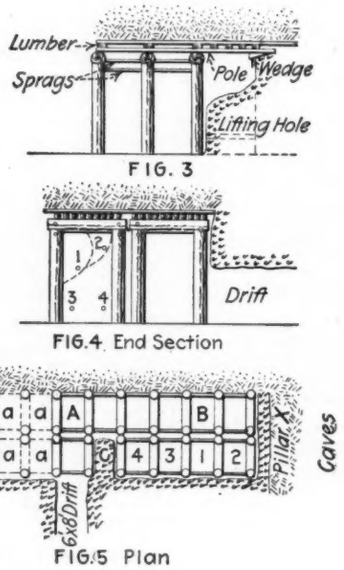
Ordinarily, in blasting a room, the center posts except the open sets are blasted. Sometimes, it is necessary to blast the side of the old caves to make the room fill. In some places, two open sets are put in the drift and the two slices carried along together. This method works well in some places where there is a solid back. The danger is that the room may come down before the last two or three sets are out, and then it is necessary to drive in a new slice and take out the remaining sets from behind.

The reason for taking out the pillar with a long and a short side, 40 ft. on one side and 10 ft. on the other, is that but one curved track is required, the four sets *a-a-a-a* are shoveled directly into the car in the drift.

(To be concluded.)



ENG. & MIN. JOURNAL FIG. 2



METHODS OF TIMBERING SLICING DRIFTS

Bavarian Mineral Production

The production of minerals in Bavaria in 1911 was as follows: Lignite, excluding the mines own consumption, 1,311,723 metric tons; bituminous coal, net production, 709,227 metric tons; iron ore, 375,409; pyrites and other sulphur-bearing ores, 81,652; rock salt, 782; and graphite, 11,298 tons. There is no production reported for zinc, lead, copper, gold, silver, tin, quicksilver, arsenic, or manganese, although there are 20 workers reported in the zinc, lead, copper and antimony mines. The Bavarian production of selenium is given at 712 kilograms. There are large productions of sandstone, fireclay, chalk, granite, etc.

Katanga Copper Deposits

JOHANNESBURG CORRESPONDENCE

The deluge of copper from the Katanga deposits has not yet arrived to overwhelm the markets and to bankrupt American producers. This was foreseen by most copper experts in America when two years ago the chairman of the English company was making optimistic forecasts. During the last year local reports of frequent stoppages of smelting tended to show that something was wrong and it was at length admitted that with copper in the neighborhood of £60 per ton it was impossible to smelt the highly siliceous, oxidized copper ore at a profit, using imported coke costing £12 per ton at the mines.

A water-jacket furnace has been erected and during this year, a two months' test run was made which produced 1002 tons of 97% copper. Coke from the Wankie colliery in South Rhodesia, near Victoria Falls, proved satisfactory. It cost £6 per ton and reduced the cost of copper production to £30 per ton landed in London. A five-year contract has been made with the Wankie company and within a year coke will be made at the Star of the Congo mine in Katanga from Wankie coal, the gas being used for steaming purposes. This coke is estimated to cost £4 10s. per ton. Meanwhile, beehive ovens are nearing completion at the Wankie mine and will provide 1200 tons of coke per month at a cost of £5 8s. per ton. Smelting is to be resumed for permanent running at the end of September. A second furnace has been ordered and is expected to be in operation early in 1913. A rough-washing plant is being erected which will eliminate much silica and alumina from the furnaces and reduce the consumption of coke about one ton per every ton of copper produced.

The reduction process by which the copper in the low-grade ore was to be reduced with coal in a reverberatory furnace and the resulting copper concentrated, has been tried on a small scale without success so far. In Ugine (Savoie), France, about 50 tons of ore have been smelted in a makeshift steel furnace by electricity and future experiments with a properly designed furnace are to be carried out. If successful a subsidiary company will supply power from the falls near the mine for this process.

In the Star of the Congo mine there are said to be developed 350,000 tons of 15% ore and 1,500,000 tons of low-grade ore. The railway will be completed to the Kambove mine by the end of the year. In this mine two to three million tons are developed. The question as to whether these oxidized orebodies are due to concentration by descending waters and are merely superficial or whether they are the capping of sulphide deposits strangely enough does not appear to have yet been solved, or if solved the information has been kept secret. There has been ample time to test this matter with a drill.

The Benguela Ry. from the West coast has been advanced 208 out of 750 miles and is carrying about £1,000,000 worth of goods per year. When the rubber district, 100 miles further on, is reached, trade will greatly increase.

The Katanga district is now connected with the east coast by railway via northwestern Rhodesia, Victoria Falls, Bulawayo, Salisbury and Beira. Capetown can also be reached by railway from Bulawayo via Kimberley.

Fuller's Earth in Arkansas

The deposits of fuller's earth near Benton, Ark., are the residual clay of igneous dikes, according to Hugh D. Miser, of the U. S. Geological Survey. The color of the clay near the surface is yellowish to reddish-brown, the deeper product is light gray to light olive green. All of the Arkansas earth is decidedly plastic, but its plasticity decreases with increasing depth. The Arkansas earth is used for bleaching cottonseed oil, hog leaf lard, beef tallow and stearine. Lack of experience in the industry has caused poor products to be put on the market and has retarded, to some extent, the introduction of Arkansas earth to displace the English earth, which is used mainly by American packers and cottonseed-oil companies.

The Arkansas earth is not used in refining petroleum, tests with it having proved unsatisfactory. In 1911, Arkansas was the third largest producer of fuller's earth in the United States, Florida being first and Georgia second.

Steel Production in 1912

The American Iron & Steel Institute has completed its first half-yearly report, covering the production of steel and of finished products for the six months ended June 30. Heretofore statistics of finished materials have been published annually by the American Iron & Steel Association. The report, which was prepared by Howard H. Cook, assistant secretary and statistician, says:

"On July 1, 1912, statistical schedules were sent to all steel works and rolling mills in the United States, asking for a return of the production of steel ingots and castings, rails and all iron and steel rolled products for the first six months of 1912. The results have been tabulated and are set forth in the following summary statement in order to secure immediate publication. A more elaborate analysis of the results, together with a study of the statistics of finished rolled products, is in course of preparation and will be published in the near future.

"The total production of all kinds of steel ingots and castings for the first six months of 1912, was 14,373,701 gross tons, of which 9,441,706 gross tons consisted of openhearth steel, 4,868,306 gross tons of bessemer steel and 63,689 gross tons of all other kinds of ingots and castings.

"The total pig-iron production did not vary greatly in the first half and in the last half of the year 1911, being 11,666,996 gross tons for the first six months as compared with 11,982,551 gross tons for the remainder of the year. It would seem fair, therefore, to make comparisons between the ingot production for the first half of 1912, and one-half of the ingot production of 1911. It should be borne in mind, however, that such comparisons are only approximately correct. On this basis the total production of ingots and castings for the first six months of 1912, shows an increase over the estimate for the similar period of 1911, of 2,535,648 gross tons, comprising an increase of 1,642,381 gross tons of openhearth steel and 894,379 gross tons of bessemer steel, and a decrease of 1112 gross tons of all other steel."

Steel Production

The total steel production, in ingots and direct castings, for the half year, in long tons, is given in Table I:

I—TOTAL STEEL PRODUCTION

	Ingots	Castings	Total
Openhearth	8,992,860	448,846	9,441,706
Bessemer	4,838,765	29,541	4,868,306
All other	51,858	11,831	63,689
Total	13,883,483	490,218	14,373,701

Openhearth steel was 65.7% of the total; bessemer, 33.9% and all other 0.4%. The production of all other steel is divided into 53,476 tons crucible steel, 6882 tons electric steel and 3331 tons miscellaneous steel, including cemented bars. The division by acid and basic processes is given in Table II:

II—ACID AND BASIC STEEL

	Acid		Basic	
	Tons	Perct.	Tons	Perct.
Openhearth	514,127	3.6	8,927,579	62.1
Bessemer	4,868,306	33.9	.....	....
Other	63,689	0.4	.....	....
Total	5,446,122	37.9	8,927,579	62.1

The total production of steel for the half year exceeded that of pig iron by 301,479 tons. There was a similar excess in 1911, and this result in 1912 may be ascribed to the same causes as last year; the use of pig iron drawn from stocks and the larger use of steel scrap in the openhearth furnaces.

Finished Iron and Steel

The accompanying Table III gives the production of finished rolled iron and steel for the first six months of 1912, showing separately the production of rolled iron and rolled steel, as well as the total tonnage for 15 classes of product. The classification used by the American Iron & Steel Association has been followed in compiling the results so that they are comparable with figures for previous years. Semi-finished rolled products intended for further rolling, such as blooms, billets, slabs, sheet and tin bars, have not been included. Plates include production rolled to No. 12 gage or thicker, and sheets, production rolled to No. 13 gage or thinner. The production of black plate for tinning and of tie plates included in the body of the table under sheets and plates are separately stated at the foot of the table.

III—FINISHED ROLLED PRODUCTS

	Iron	Steel	Total
Plates	30,917	1,567,310	1,598,227
Sheets	26,397	1,300,137	1,326,534
Total	57,314	2,867,447	2,924,761
Rails	.....	1,466,565	1,466,565
Nail plate	6,930	18,045	24,975
Structural shapes	.....	1,223,886	1,223,886
Wire rods	.....	1,220,004	1,220,004
Merchant bars	426,191	1,424,212	1,850,403
Bars for rein. concrete	2,169	118,813	120,982
Skelp	141,355	989,063	1,130,418
Splice bars	14,761	92,020	106,781
Hoops	.....	130,345	130,345
Bands and cotton ties	12	204,322	204,334
Rolled forging billets	1,066	187,771	188,837
Other rolled products	129,683	479,845	609,528
Total rolled products	779,481	10,422,338	11,201,819
Black plates for tinning	1,057	498,294	499,351
Tie plates	24,446	70,690	95,136

Comparisons with the previous year cannot be made, as heretofore these statistics have been collected only by yearly periods.

Rails

The production of rails for the half year, classified by weight and kind of steel used is given in Table IV. No iron rails were made.

The openhearth rails were 63.2% of the total made; bessemer, 33.9%, and others 2.9%. The remarkable point in this statement is the increase in proportion of openhearth rails, which, in 1911, was 59.4%, and in 1908 only 29.4% of the total.

IV—RAILS MADE

	45-lb. and under	45–85 lb.	85-lb. and over	Total
Bessemer	52,142	272,029	172,756	496,927
Open-hearth	29,559	238,388	658,557	926,504
Electric	10	87	45	142
Rerolled	41,973	1,019	.....	42,992
Total	123,684	511,523	831,358	1,466,565
Per cent	8.4	34.9	56.7	100.0

California Oil in July

The net production of petroleum in California fields in July was 7,013,858 bbl., an increase of 117,993 bbl. over June. There was a decline in daily average from the 30 days in June to the 31 days in July of 2645 bbl., chiefly in southern fields, particularly in Salt Lake-Sherman, which amounted in that field to 1755 bbl., due largely to curtailment of Amalgamated production. Fullerton-Puente declined about 500 bbl. per day. Midway increased about 3000 bbl. per day, making an advance in total production from 1,989,072 in June to 2,081,271 bbl. in July.

CALIFORNIA PRODUCTION BY FIELDS

District	Bbl.
Fresno County—	
Coalinga	1,575,025
Kern County—	
Midway	2,081,271
Kern River	917,267
McKittrick	548,484
Sunset-Maricopa	419,129
Lost Hills	106,233
Total Kern County	4,072,381
Santa Barbara County	
Santa Maria, Lompoc, Cat Canon	448,843
Summerland	4,350
Total Santa Barbara County	453,193
Southern Fields—	
Fullerton-Puente	470,660
Salt Lake-Sherman	198,595
Coyote-La Habra	89,707
Ventura County	59,216
Whittier	52,920
Los Angeles City	31,842
Newhall	10,310
Total Southern Fields	913,259
Total in all fields	7,013,858

Shipments in July were 6,314,579 bbl., a decrease from June of 105,826. In addition there were seepage and evaporation losses of 128,366 bbl. The total stocks on July 31 amounted to 45,490,175 bbl., an increase from June of 570,913.

The record of field development in July shows 44 new rigs, 65 completed wells, 6021 active producing wells, 681 idle producing wells, 408 active drilling wells, 307 idle drilling wells, 28 wells abandoned.

The metallurgical plant of the Primos Chemical Co., at Primos, Penn., was partially destroyed by fire on Aug. 20; that portion of the plant has been rebuilt, and was to be placed in commission again during the current week.

PERSONALS

Mining and metallurgical engineers are invited to keep The Engineering and Mining Journal informed of their movements and appointments.

John W. Mercer sailed from New York Sept. 7 on his way to Ecuador.

D. A. Herron, manager of the Tomboy Gold Mines Co., Ltd., is in Denver.

John T. Glidden has been appointed general foreman of the Cerro de Pasco mills, in Peru.

Philip L. Foster, of the Exploration Co., has returned to Denver from a visit to Telluride, Colorado.

H. A. Linke, of Palisade, Nev., is in Chicago on professional business, and expects to go to Nevada soon.

R. C. Benner, Department of Industrial Research, of the University of Pittsburgh, spent the month of August in Ontario.

Franklin Wheaton Smith was married to Miss Ernestine Craig, Aug. 24, at Fairholm Island, Muskoka Lake, Ontario.

Alexander P. Rogers, of New York, is in Panama on professional work. He expects to return to New York early in October.

Allen H. Rogers is engaged in professional work in Utah. He expects to return to New York about the middle of September.

Frederick J. Apgar, mining geologist, of Jamaica, N. Y., is engaged in an examination of iron-ore deposits in northern New Jersey.

Howland Bancroft, of Denver, is occupied in making examinations in western Colorado, returning to Denver about the middle of September.

Cecil Pocock, for the last three years with the Cerro de Pasco Mining Co., is now in charge of the Santa Clara group of mines, at Morococha, Peru.

Herman L. Schneider has been appointed superintendent of the New State Smelting Co., of Socorro, N. M., and took charge early in August.

Norval J. Welsh is at Orogrande, N. M., planning the development and operation of the By Chance group of copper-gold claims for the Jarilla Copper Syndicate.

Norman B. Roper, formerly of the Cerro de Pasco Mining Co., Peru, now with Backus & Johnson Co., of Casapalca, Peru, is visiting the United States.

Henry H. Armstead has finished his inspection of the properties of the Colmena Mining Co., at Guanajuato, Mexico, and has left for New York. He will return to Mexico in November.

W. H. Aldridge is changing his headquarters from Los Angeles to the Bankers Trust Bldg., 14 Wall St., New York. He will continue to take charge of William B. Thompson's mining interests.

George E. Farish who has been in his New York office since leaving Porcupine, Ont., several weeks ago, is on his way to Arizona, where he will examine a copper property. He expects to return to New York the latter part of September.

S. S. Arentz, general superintendent of the Nevada-Douglas Copper Co., and the Nevada Copper Belt R.R., will have his office at Salt Lake City, Utah, after Oct. 1. He will have charge of the construction of the Interurban R.R., between Salt Lake City and Payson, Utah.

James Bowron, president of the Southern Iron & Steel Co., who was appointed receiver when litigation was started, has been chosen trustee in bankruptcy. The Federal court has named William S. Lovell, A. H. Carpenter and John H. Adams to appraise the property of the company.

Dr. A. E. Barlow, president of the Canadian Mining Institute, left Montreal for British Columbia, Aug. 18. His intention is to visit a number of the mining centers in West Kootenay and elsewhere before proceeding to the Coast. He will preside at the Western meeting of the institute in Victoria, on Sept. 18 and 19, and also at a meeting to be held, Sept. 30, at Frank, Alberta.

R. B. Hutchinson, of Chihuahua, Mexico, is on a motoring jaunt from Los Angeles to San Francisco and through the Yosemite Valley, in California. After an an active connection of 14 years, during which time he developed and managed the Concheño mines, in Chihuahua, and, subsequently, the mine and smelting plant of the Rio Tinto Copper Co., of Chihuahua, Mr. Hutchinson has resigned the position of general manager of the Corrigan, McKinney & Co., of Cleveland, Ohio., interests in Mexico, and, on his return from California, will establish an office as consulting and examining engineer in El Paso, Tex., Norval J. Welsh will be associated with him.

OBITUARY

J. W. Horne, secretary and treasurer of the Utah Apex Mining Co., died in Falmouth, Mass., Aug. 25 last.

J. Newton Cole, treasurer of the Calaveras Copper Co., and secretary of the F. L. Ames estate, died suddenly, Sept. 3, in his office at Boston.

James Terry Gardner, of New York, died at Northeast Harbor, Maine, Sept. 10, aged 69 years. He was born at Troy, N. Y., and educated as a civil engineer in Rensselaer Polytechnic Institute and the Yale-Sheffield Scientific School. During the civil war he was employed by the United States Government as inspector of the harbor defenses of San Francisco, and later served on the U. S. Geological Survey. From 1876 to 1886 he was director of the New York State Survey, and during the same period served on the State Board of Health. In the latter part of his life Mr. Gardiner entered the coal business, becoming vice-president of the coal companies of the Erie R.R.; president of the Mexican Coal & Coke Co., Randolph-Macon Coal Co., and West Kentucky Coal Company.

Societies and Technical Schools

Wisconsin State Mining Trade School—The school at Platteville opened for the fall term Sept. 4. A full two-year course in mining engineering is now given at this institution. The school, has during the past few months, installed much new equipment. The chemical laboratory has been enlarged and equipped to accommodate the increasing number of students. A new Fairbanks-Morse oil engine has been added, and a small concentrating mill is being installed for experimental work.

California State Miners' Association—The California Miners' Association plans to aid the Panama-Pacific Exposition directors in securing for the 1915 world's fair a complete mineral exhibit from all the states west of the Missouri. The executive committee of the association met recently and a committee of three was appointed to confer with the exposition directors. This committee consists of President William C. Ralston, Charles G. Yale, statistician of the U. S. Geological Survey and C. B. Branden, vice-president of the Selby Smelting Co. The committee will confer with the exposition directors as to the form of call to be issued for a convention to be held in San Francisco of the California Miners' Association in November.

American Peat Society—The sixth annal meeting was held in New York, Sept. 5-7. Sept. 5 there was a business meeting and a session for reading and discussion of papers; also two sessions on Sept. 7. Sept. 6 was taken up by an excursion to the Alphano peat plant, on the Great Meadows, near Hackettstown, N. J. The meeting closed with the annual dinner. The presidential address was by Dr. J. A. Holmes, director of the Bureau of Mines. Among other papers presented were: "Drainage Work in North Carolina," Dr. Joseph Hyde Pratt, State Geologist North Carolina, Chapel Hill, N. C.; "Peat Fuel and Methods of its Preparation," Dr. J. Arthur Mighill, Boston; "Investigation into the Methods of Drying Peat by Pressure," G. Herbert Condict, Plainfield, N. J.; "The Peat Fuel Work of the Canadian Department of Mines," B. F. Haanel, B. S., Ottawa; "A Successful Peat Fuel Plant," Ernest V. Moore, Alfred, Ont.; "Drying of Peat," Robert Ranson, St. Augustine, Fla.; "Peat Coking," Edward A. Beals, Hartford, Conn.; "Progress of Peat Utilization in 1911," Prof. Charles A. Davis, Washington.

Editorial Correspondence

From our Representatives at Important Mining Centers

San Francisco

Sept. 5—It is not improbable that gas produced from the wells drilled for oil will ultimately displace crude oil as fuel for pumping and drilling in those fields where the gas is produced in considerable volume. Electricity has, in many places, been adopted in the place of crude oil, and the experimenting with gas has reached a point where it is coming to be recognized as a strong competitor of electricity. The Pacific Light & Power Co., which operates oil wells in the Salt Lake field, near Los Angeles, is using gas for power to generate electricity. One of its electric power plants is driven by steam, using natural gas for fuel. The company is installing two 250-hp., 16x21 Buckeye, single-tandem engines. The plant is connected with the company's power line that extends into Los Angeles. Gas engines have been employed for several years on the oil-land lease that the company operates, for drilling and pumping. The Rancho La Brea, in the same field, is reported to be employing 1000 hp. for pumping and drilling with gas fuel, and finds it unnecessary to use oil for power fuel. This company is said to have the greatest amount of gas of any operator in the field, and if the Pacific Light & Power Co. succeeds with its experiments, it is expected that it will endeavor to obtain by purchase or lease the valuable lands of the Rancho La Brea. Formerly the gas in the fields has in many, if not in most instances, been allowed to go to waste. The field consumption of oil for fuel has usually averaged about 350,000 to 500,000 bbl. per month, which means approximately $150,000 to $200,000 per month for fuel in all fields.

Unexpected rain fell in various parts of the state, Sept. 1, and in some places has continued intermittently. In Siskiyou and Trinity counties, the weather has been unusually cold for so early in the season. In Nevada and Shasta counties rain is much earlier than usual. In other mining counties there is rain or indication of early rains. Last spring predictions were made that the mines would suffer from lack of water before the end of the summer season; but the facts do not bear out the prediction. Only one district has actually complained of lack of water, and that was for use in placer mining, at Magalia. The only dredging operation reported to have lacked water is the Siskiyou Dredging Co. dredge, on McAdams Creek, in Siskiyou County, but the fear of continued dry weather seems now to have passed.

The Mammoth Copper Mining Co. has complained to the state railroad commission that the rates charged by the Southern Pacific for transportation of blister copper from Kennett to San Francisco is excessive, and asks that it be reduced. The rate is $3.50 per ton and the distance is only 273 miles, while the rate from Chicago to New York, a distance of 900 miles, is only $2.70 per ton. The present railroad commission has been liberal to the shippers in all branches of industry in the matter of requiring the railroads to reduce rates, and it is expected that the reduction of 50c. per ton asked by the Mammoth company will be granted on proper showing. The present railroad commission is the first in California for 20 years that has given much heed to the demands of shippers.

Denver

Sept. 6—Figures from valley reduction plants and the various local mills of the Cripple Creek district are as follows: Valley plants and smelteries, 44,850 tons, value, $1,070,250; local plants 28,456 tons, value $82,100; so that the production of the camp is maintaining the high mark set early in the year. The Colburn-Clancy process mill is expected to be running again this month. The water-level recession during August has been about 15 ft., and a still lower drainage tunnel is being contemplated.

In the case of the government against Stratton's Independence, Federal Judge W. H. Pope, of New Mexico, has handed down the decision that to remove ore from mines does not cause such depreciation of the property as to give the mine owners the right to refuse to pay the federal corporation income tax assessed on the net earnings by the commissioner of internal revenue. The ruling means that the mines of Colorado will be forced to pay thousands of dollars taxes each year, which they hoped to avoid by bringing up the question that when gold, silver or other metal is taken from them, it causes a loss that cannot be replaced and therefore must be counted as depreciation, and not to be taxed under the law passed in 1908. The government sought to force the Stratton's Independence company to pay approximately $1500 for taxes for the years 1909 and 1910. Other mines were assessed in proportion to their net earnings, and all of them, following the lead of Stratton's, paid the taxes under protest and made the same claims. Stratton's Independence was selected to make a test case and filed suit through its attorney, William V. Hodges, for a recovery of the money paid to the government for the tax of 1% on income over $5000. The other big mining companies of the state supported the Independence in the suit. The case will be appealed, and meantime the mining companies will continue to pay the excess tax on their net earnings over $5000 under protest.

It is reported that Henri Chagneux, representing French interests, is investigating vanadium ore deposits in the Coal Creek district, near Meeker, in Rio Blanco County. Steady shipments of carnotite ore continue to be made from Paradox Valley to Europe.

Butte

Sept. 4—E. B. Milburn, of Butte, has sold to the Congdon-Cole interests, of Duluth, the Michigander, Third Sphinx, Morel, Carn Brea, Wanda, Valley Queen, and an interest in the Sarah lode claims, adjoining the Butte & Superior property, north of Butte. The price paid was about $500,000, and deeds recorded show that cash is being paid for the claims. It is not known when work will be started.

The activity in acquiring mining ground in the district north of Butte, which began several months ago, continues unabated, and in addition to Duluth capital, which was the first to enter the field, Spokane men have come prominently to the fore and have obtained valuable holdings. A group of 10 claims in Dixie Gulch, about ¾ mile north of the horse-shoe bend of the Great Northern R.R., has been acquired by Spokane men, who have organized the Butte Northern Mining Co. North of these lies the Dewey claim, in which at slight depth, silver and copper have been discovered, and the property of the Butte & Great Falls Co. The Butte Consolidated company's property adjoins it on the west, and south of the claims are the holdings of the Butte & Bacorn Mining Co. Several veins have been developed slightly by shallow shafts and surface cuts with good indications. On the east side of the gulch a crosscut tunnel has been started to intersect one of the veins which outcrops strongly on the surface. It has now attained a depth of 50 ft. and it is expected that the vein will be cut in the near future. G. W. Lansing, secretary of the company, is in Butte directing operations.

Salt Lake City

Sept. 5—Owing to the rise in the price of metals, an increase in wages of 25c. per day has been granted by Bingham operators. The new scale went into effect Sept. 1.

The delegates to the national convention of the American Institute of Banking, meeting in Salt Lake City, made an excursion to Bingham, Aug. 24, to see the camp, and steam-shovel operations of the Utah Copper Co., stopping at Garfield to visit the mills and smeltery.

At a meeting of the Utah Conservation Commission, held recently, the following new officers were elected, and new committees appointed: On Conservation of Forests, O. J. Salisbury and L. A. Merrill; Agricultural Conservation, John A. Widtsoe and Professor Merrill; Conservation of Power Sites and Water, George Austin and T. L. Allen; Conservation of Mineral Resources, J. E. Pettit and H. T. Haines. Governor William Spry is chairman, who, together with the above mentioned committees, constitutes the executive board. Reports of the work of the commission are now in press, and will be ready shortly for distribution.

The question as to whether workers in underground coal or hydrocarbon mines in Utah can be employed longer than eight hours per day has been decided in an opinion given from the attorney-general's office. This was in response to an inquiry by J. E. Pettit, state coal-mine inspector, who asked whether Sec. 1337, Compiled Laws of Utah, 1907, regulating hours of employment in underground mines, applied to coal and hydrocarbon mines. According to the attorney-general's opinion, it is unlawful for any worker to be employed underground in any mine longer than eight hours per day, except in a case of emergency, or where lives or property are in danger. The opinion states that the inspector should investigate reported violations, and if any are found, take the matter up with the county attorney of the county in which the violation occurred, who should prosecute the violators.

Spokane, Wash.

Sept. 3—With the expected arrival in Spokane in a few days of Secretary James F. Callbreath and Assistant Secretary Walcott, of Denver, active preparations for the annual convention of the American Mining Congress will be made. The convention will be held Nov. 25 to 30. *En route* from Washington, D. C., to Spokane, Secretary Callbreath is making stops in Pittsburgh, Chicago and other Eastern cities, arousing interest in the Congress. Local offices in charge of Sydney Norman have been opened in Spokane, at 701 Paulsen Bldg. On the arrival of Mr. Callbreath, a large gathering of mining men will be held to welcome him and to take up further arrangements for the convention. Dr. Joseph A. Holmes, director of the Bureau of Mines, will be on the list of speakers. Conservation will be one of the topics to be discussed.

To secure the enactment in the State of Washington of an act similar to the "blue sky" law of Kansas, the Spokane Mining Men's Club will coöperate with Governor Marion E. Hay. The club adopted resolutions in favor of the governor's stand for the law, and, in case a commission is appointed to frame the bill, the local club will have the privilege of naming some of the members. In an effort to secure all views regarding such a law, the Mining Men's Club has invited many representative men to give their opinion. During the Interstate Fair, to be held Sept. 30 to Oct. 6, the Spokane Stock Exchange and the Mining Men's Club will entertain and give a luncheon to the mining men of the West.

Porcupine

Sept. 5—A rush has started to Gauthier township where a French prospector has staked some claims with extremely good free-gold showings. Gauthier is west of Larder Lake and is reached from Porcupine by the Timiskaming & Northern Ontario Ry. Several parties have left Cobalt and Haileybury for the new field, and more authentic information will be available upon their return.

The Arbitration Board to settle the dispute as to wages between five of the Porcupine mines and their employees has been organized with Peter Macdonald, of Woodstock, as chairman, Professor Haultain, of Toronto University, representing the employers, and the secretary of the local branch of the Western Federation of Miners as representative of the men.

Toronto

Sept. 7—In the course of the investigation by Samuel Price, mining commission, as to the necessity for an 8-hr. day for underground workers, a hearing was given at Cobalt, Aug. 31. The Cobalt Mine Managers Association presented its views in a written document setting forth that if the hours were reduced wages would also be cut down. The average number of hours men drilled in a 10-hr. shift was 6.45, which, it was presented, would be reduced to 4.45 in an 8-hr. shift or a reduction of 31% in the production. The Cobalt mines had to make a heavier outlay than their competitors in warmer countries, to protect the men against severe climatic conditions and had also heavy marketing expenses. They paid large royalties and heavy taxes and were preparing to adopt a workmen's compensation bill, and the additional burden would be detrimental to provincial interests. Like legislation had a disastrous effect in British Columbia and many mining districts of the United States and its tendency would be to divert capital from Canada. Statistics showed that underground mining at Cobalt was not unhealthy, 90% of the employees preferred underground to surface work. Under an 8-hr. day operations would be hurried and there would be more accidents. The case for the 8-hr. day was presented verbally by officials and members of the Western Federation of Miners. William Davidson said that in British Columbia after the 8-hr. day had been adopted the mining industry had expanded and there was more capital in the province than ever. The Cobalt camp had a world-wide reputation as a dividend-payer and could afford to have shorter hours. Butte had the 8-hr. day, yet paid all miners not less than $4 per day and the companies were paying big dividends. Other speakers claimed that the Cobalt mines were unhealthy. A. G. Slaght of Haileybury, appealed for an 8-hr. day for the mill men who, he declared worked from 11 to 13 hr. daily under conditions which produced deafness. At the hearing at Porcupine there was no organized opposition to the 8-hr. day.

Johannesburg

Aug. 12—The Apex gold mine has been closed down owing to shortage of funds and the failure of the negotiations to amalgamate with the Benoni mine which has also been closed down. Only another boom and the restoration of confidence in the prospects and management of the mines of the Rand will enable funds to be raised at reasonable rates to allow development work on these and several other mines to be resumed. The Rand will shortly be in need of new mines to take the place of several outcrop mines approaching exhaustion. The mining groups with the exception of the Randfontein, have at last arrived at an agreement to discontinue individual recruiting in British South Africa and there is now a prospect of the industry saving nearly as much as it must spend under phthisis compensation. In further reviewing the native labor situation it must be remembered that nearly 80,000 natives per year are recruited from Natal and that the industry of sugar planting is an important and growing one there. In the past the unskilled labor was supplied by indentured Hindoo natives from India. This has however, been made impossible by a law prohibiting further importation of indentured Indians. These planters are now being compelled to compete with the mines for Kaffir labor.

There are said to be about 4500 cases of phthisis awaiting compensation on the Rand itself and over 500 widows are expected to arrive from Cornwall and elsewhere to have their claims investigated.

The Mining News

The Current History of Mining

Alabama

Quenelda Graphite Co.—This company will rebuild its plant at Quenelda, that was recently destroyed by fire.

Alaska

A Bucyrus dredge of 3000 cu.yd. daily capacity is being built at Nome by H. Greenburg.

Overland, and Three Lakes—As soon as mine developments warrant it a small mill will be built at this Porcupine Creek property owned by James R. Hayden.

Skeen-Lechnor—The mill will be enlarged and an aërial tramway will be built this autumn at this Falls Creek property.

Brewer-Alaska—The tunnel being driven on this Lost Creek property is reported to be in ore.

Alaska-United—During the month of July 17,374 tons of ore was crushed in the Ready Bullion mill, from which 491 tons of concentrate estimated to contain $26,176 in gold, and $25,805 in free gold was saved. The total realizable production was $51,461. The operating expenses were $23,563; the estimated operating profit was $27,898; construction expenses were $2034; the estimated net profit was therefore $25,865. The yield per ton of ore milled was $3.56. In the 700-ft. Claim mill 20,076 tons of ore was crushed, from which was produced $27,603 in free gold, and $30,885 in 370 tons of concentrate. The total realizable value of the product was $57,903. The operating expenses were $27,168; the construction expenses were $2656; the estimated net profit was $28,079. The yield per ton of ore milled was $2.91.

Alaska-Mexican—During the month of July 19,824 tons of ore was crushed, from which 402 tons of concentrate was saved. The estimated gross value of free gold recovered was $29,547, and the estimated value of the gold in the concentrate $33,895. The total realizable value was $62,808. The operating expenses were $24,847; construction expenses amounted to $4922, leaving an estimated net profit of $33,039. The yield per ton of ore milled was $3.20.

Dickey Copper Co.—This mine, on Fidalgo Bay, near Landlock, has been shipping from 400 to 600 tons of ore per month, the average grade for the shipments during the summer being about 12% copper.

Arizona

Cochise County

Commonwealth Mining & Milling Co.—Plans for a 300-ton mill have been prepared, the preliminary specifications issued and bids asked for. The plans were prepared by Edgar A. Collins and A. L. Wartenweiler.

Gila County

Miami—The production in August was 4322 tons of concentrate assaying about 36% copper, which will yield about 2,900,000 lb. of fine copper. The mill recovery is reported to be 70%. There was mined during the month 97,890 tons of ore and 4802 ft. of development work was done. About 30% of the ore came from development work, 25% from the shrinkage stopes, 35% from square-set mining next to the capping, and 10% from the stockpile. The second 500,000 gal. mill-water storage tank has been erected, making a total capacity of 1,000,000 gal. A 600-hp. Babcock & Wilcox boiler is being installed in the power house at Miami, making a total of 2400 b.hp. When the installation is complete, the second 4000-cu.ft. Nordberg air compressor will be operated. Foundations are being laid for the new steel-and-concrete change house, and the construction of the new hospital, jointly with the Inspiration company, has been started. It is designed to accommodate 40 patients and will be equipped with the most modern appliances. Two churn drills are steadily at work developing the northeastern part of the property and diamond drilling continues on the 570-ft. level. About 1000 men are employed.

Inspiration Consolidated—About 600 men are employed in underground development, and in construction work. Mine development is proceeding through five shafts and two tunnels and two main working shafts are rapidly being sunk. The main east shaft is over 180 ft. deep and was sunk 172 ft. in August, which is claimed to be the record for a standard, 3-compartment shaft in the United States. The main west shaft is more than 350 ft. deep and was sunk 146 ft. in August. The company has made a contract with the U. S. reclamation service to take 7500 kw. of electric power from the Roosevelt dam, about 40 miles distant, and a survey for the transmission line has been started. The government does not guarantee continuous service, however, and the company will build an emergency steam power plant capable of generating 7500 kw. H. Kenyon Burch and assistants, who are working on the plans for the 7500-ton concentrator, have moved into the new temporary office at the mill site.

Southwestern Miami—Churn-drill holes Nos. 6, 7 and 8 are respectively 925, 927, and 880 ft. deep and are all to be enlarged by under-reaming preparatory to drilling deeper. Hole No. 8 is reported still to be in chalcocite-bearing schist, which it first encountered at 720 ft. and which was reported to be of commercial grade at 820 ft. Hole No. 7 is in silicified, iron-stained schist and hole No. 6 is in schist slightly mineralized.

Iron Cap—At this mine on Copper Hill, the drift east from the Williams shaft on the 650-ft. level is reported to be in ore.

Black Warrior—W. D. Fisk and Henry Snell have taken a lease on this mine near Miami and will start work soon.

Maricopa County

Vulture—A pipe line is to be built from the Hassayampa River to this mine. The wells near the mine, which were drilled several years ago, do not supply enough water for the mill.

Buffalo-Arizona Consolidated—This company expects to place its mill, near Morristown, in operation during September. Much development work has been done on the property.

Monarch Mining Co.—The company is installing a pump on the Hassayampa River below Wickenburg. A pipe line will run from the pump to the mill, which is four or five miles away.

Santa Cruz County

Austerlitz—This old property, which has lately been developed by Doctor Noon and associates, of Nogales, has been bonded to Woodworth and Layne, formerly operating in Sonora. The mine was worked in the old days, but was abandoned because it was thought to have been a surface enrichment. The owners think they have disproved this theory, and show their faith by works. Since this property has been taken up, there is something like a boom on in the whole Oro Blanco district, lying next to the international line, and including the Old Glory mine, another old mine, which has been a producer, and also the Yellow Jacket and the Montana, now under bond to Capt. L. W. Powell and W. J. McDermott.

California

Amador County

Defender—This mine near Volcano, has been closed down temporarily on account of scarcity of water. The water supply comes through the McLaughlin ditch. F. B. Joyce, manager.

Bunker Hill—The 74th monthly dividend was paid Aug. 15 at the rate of 5c. per share. The reduction is a result of appropriations for improvements, including a steel headframe, compressor, and the sinking of a new shaft. A residence for the superintendent will also be built. E. Hampton, Amador City, superintendent.

East Eureka—The new 20-stamp mill is now being steadily operated. E. A. Davis, Sutter Creek, superintendent.

Butte County

The miners near Magalia are complaining of shortage of water. It is said that this is the dryest season in years. Some mines are idle and others are working only part time, or with reduced forces. There is reported to be trouble between the miners and the power company. The contention of the power company is that it wishes only to conserve the water to best advantage.

Calaveras County

Chapman—The mill is running regularly on good gravel. A good vein of low-grade ore has been disclosed. This will not be worked at present, operations being confined to mining and milling the gravel; 25 men are employed.

Ford—The vein recently uncovered is reported to be wider and richer than where first cut.

Gold Hill—A vein of soft quartz has been disclosed in this mine at Bear Mountain. It is milling ore, and carries iron pyrites impregnated with gold.

Eldorado County

Lukens—H. C. Rantz, G. W. Davis, L. N. White and E. L. Cleveland have leased this mine near Cool. The development is reported to be making a good showing.

Mulby Point—This mine, two miles from Georgetown, recently bonded to Robinson and Costello, is being developed.

Cedarburg—It is reported that work will be resumed on this mine, near Spanish Dry Diggings. It is an old property that was a large producer at a depth of 140 ft., but has been idle for 36 years. E. W. Hulford, Georgetown, owner.

Mother Lode Mines Consolidated—The Union mine and adjoining properties have been taken over by Greeks of San Francisco and Oakland and this corporation has been formed to operate them. Alexander K. Pavellus, editor of *Eirenokos*, a Greek newspaper, and secretary for the Greek consul at San Francisco, is a member of the corporation. The Union was one of the first and largest producers in the early days of Mother Lode mining. It was operated by Alvinza Hayward. A. Harpending, of El Dorado, has owned the mine for a number of years.

Humboldt County

Horse Mountain—The new sawmill being constructed will soon be ready for sawing lumber for surface improvements; 35 men are employed in development and installation of equipment.

Inyo County

Skidoo—During the month of July, 10½ days were lost, but 1201 tons of ore was milled from which amalgam bullion worth $15,684 was produced, and $6049 was recovered in the cyanide plant. The costs were $6794 for operation and $1054 for development, a total of $7848, leaving $13,885 net profit.

Nevada County

Pennsylvania—Preparations are being made for the installation of a 75-ton cyanide plant, to be built on the same lines as the plant now in operation at the Empire mine. An Oliver continuous filter will be part of the equipment. The mine is under bond to the Empire.

Colorado

Clear Creek County

New Era—The development of this property, at Freeland, is progressing with favorable results. James Cousins, manager.

Castle Rock—Development of this group of claims, near Freeland, has been resumed. R. D. Blair, manager.

Legal Tender—David Jones and Edward Reiling have secured a two-year lease on this property, in Gilson gulch. Recent development has disclosed a vein of lead ore.

Franklin—This property has been leased to John Peterson, who will reopen the mine at once.

Humboldt—This tunnel will be advanced 1300 ft. The contract has been awarded to Mr. Banard, who will commence work at an early date.

Bride—The west drift has been advanced 60 ft. to a place under the shaft. A raise will now be extended to connect with the shaft for ventilating purposes. An Ingersoll-Rand drill has been added to the equipment. A vein of lead and iron sulphides has been opened.

Treasure Fault—The operation of this property has been resumed and small shipments of gold ore are being made to the local sampler.

Gold Quartz—Development of this property, in the Alice district, has been resumed. The work is being done under contract.

Lake County—Leadville

Ella Beeler—A. S. Sharp & Co., lessees, have opened two good streaks of silver-lead ore in two raises from the tunnel. The veins are about 12 ft. apart and about 1 ft. in width. Two carloads have been shipped to the Arkansas Valley plant. The ore is galena with native silver.

Siwatch Tunnel—It is reported that pay ore has been opened in the tunnel.

Minnie Lee—Medium-grade, zinc-sulphide ore has been opened in this mine, operated by lessees through the Yak Tunnel. Shipments will commence at once.

Matchless—Shipments of ore are being made by lessees. The ore comes from the bottom level.

Sugar Loaf Consolidated Co.—The big tunnel is being driven ahead; the shipments are about 20 tons of good-grade ore daily.

Long & Derry—Two carloads of the rich silver-lead carbonate ore recently opened in the Anona workings are being shipped, and the drift in which it was found is being connected with the main workings.

San Juan District

Brown Mountain Pyritic Smeltery—This new mill, at Ouray, is assured of a steady supply of ore from the Indiana mine, in the Ironton district, and from the Wanakah company, which later will furnish 65% of the 80 tons per day required, besides the high-grade ore that is shipped to the Salida smeltery.

Wellington—From these mines, near Rico, which are owned and operated by Jesse Knight and associates, of Utah, about three carloads of lead, zinc and copper ore are being shipped weekly to Salt Lake City. About 30 men are employed. It is said that a new tramway and concentrator will be built shortly.

Wagner Developing Co.—This company is developing the Alta property; 30 stamps are dropping in the mill at the lower end of Gold King basin. During the last few months the lessees have done considerable surface prospecting and development with favorable results. In the company's Hancock property much pay ore has been opened. A 2-bucket auxiliary tramway has been built from this property to the mill loading station. The buckets have a capacity of 1000 lb. each. The tram is 700 ft. long and has a fall of 400 ft. John Wagner is manager.

Teller County—Cripple Creek

Black Belle—A discovery of rich gold ore was made recently at shallow depth by H. Barbee, lessee. An electric hoist will be installed at once and the ore broken with machine drills.

Free Coinage—Smelting ore has been opened in the Pinto claim by Hodgin & Johnson, lessees.

Henry Adney—The output is increasing and from now on will be about three carloads per week. The shoot is over 100 ft. in length, and 500 ft. below the surface.

Ocean Wave—Ore is being hoisted from the 100-ft. level by W. S. Copeland, lessee. The output will be two carloads per week.

School Section Leasing Co.—This lease is producing from two to three carloads per week of milling ore. The company is considering the erection of a mill.

Idaho

Coeur d'Alene District

Snowstorm—The mill has been closed temporarily in order that necessary repairs may be made. The machinery for the new unit is now being installed in the old original Snowstorm leaching plant. Both the old and new units will be in operation in a short time. Development work has again been started in the No. 4 tunnel, in which the orebody has never been found. The company has a large tonnage of ore in the No. 2 and 3 tunnels already blocked out ready for treatment.

Silver Cable—The new intermediate tunnel at this property is nearing the vein. This tunnel is being driven between the upper and lower workings and will give a depth of about 100 ft. Much iron oxide and a large flow of water have been encountered on this level. The vein will be thoroughly prospected on this level so that it may be located on the lower level.

Electric—The owners of of this group of claims have settled differences and work is to begin at once. There is an excellent surface showing on the property but owing to the internal trouble no work has been done. A compressor is to be purchased and a large amount of development work is contemplated.

Nellie—The first shipment of ore for several years from this property is now being hauled to the railroad. All the ore is first-class, nand picked, for the company has no mill. It consists chiefly of gray copper, rich in silver. This ore has come from the drift from the winze in the lowest level. The ore is hauled 1½ miles to the railroad.

Surprise—A consolidation of this property with the Highland Chief group is being planned. Such a consolidation would greatly benefit both companies for it would greatly reduce the operating costs. The Surprise is practically the only shipper in the Pine Creek district, shipping both lead and zinc concentrates. The property is equipped with a 100-ton concentrator and a power plant. During the last year 650 tons of lead concentrates were shipped. The orebody is small, however, and the cost of extraction through a shaft would be too great unless a larger tonnage could be developed. This might be done by working the Highland Chief ground which is on the same vein and covers the vein for a distance of 4500 ft. Milling ore has already been developed on this part of the vein, although comparatively little work has been done. The latter property also controls water rights which would assure the company plenty of cheap power.

Idaho County

Mascot—Work on the mill foundation at this mine on the American River is nearing completion. The pipe line has been put in place and the ore bins at the mine and the tramway are completed.

Black Pine—The custom plant is running on a test shipment from this mine, owned by John Williams.

Kansas

Quick Eight—This mine on the old Taylor-Foster land at Galena produced 280,000 lb. of ore during a recent week, which yielded 54,230 lb. of concentrate. The ore is being mined from the 80-ft. level. Rich ore has been opened.

Wyandotte—A high face of rich ore has been opened in this mine, 1¼ miles west of Galena. The land has been idle for 18 years, former operations having been carried out near the surface. The company now operating the property has penetrated the ore at the 90-ft. level after sinking through a tough formation.

Blackburn Mining Co.—This company is mining ore at a depth of 84 ft., on the Playter land, and 140 tons of ore recently sent to a custom mill produced 39 tons of jack.

East Galena Co.—A drilling campaign is being conducted by this company. A sheet-ore formation is said to have been penetrated at a depth of 200 ft., which seems to be in the Grand Falls chert and is similar to the sheet ground of West Joplin. Former mining has been conducted in pocket formations which seldom extend below a depth of 90 feet.

Michigan

Copper

The John A. Roebling Sons' Co. has purchased from the Bigelow-Hyams interests the Dollar Bay Land & Improvement Co. and the Tamarack & Osceola Manufacturing Co., which involves a total of 3045 acres of land and the wire mill. The Roebling company has had this mill under lease for several years, and it is stated that it will be enlarged to take care of the company's product for the northwestern part of the country. It is also stated that eventually the wire ropes, etc., sold in this territory will be manufactured at this plant.

Winona—This company is experiencing considerable difficulty in securing the necessary labor to increase production. Shipments of 300 to 400 tons of ore daily are being made to the mill while the underground openings are ample and the stamp facilities are such that between 1200 and 1500 tons could be crushed. The nature of the formation is such that a large percentage of the copper remains in the slimes, but it is stated that a large portion of this is being recovered by the use of tube mills and tables and that additional tube mills are to be installed. The company is also installing a number of the one-man drilling machines.

Lake—Underground conditions at this property are satisfactory. Shipments averaging about 300 tons daily are being made to the mill and as soon as the necessary additional trammers can be secured production will be materially increased, as the openings are sufficient to produce a much larger tonnage. About one-third the present tonnage is being taken from the stockpile.

Hancock—The crosscut from the 34th level of the shaft has been extended a distance of about 665 ft. and is breasted in a formation carrying much copper. This condition has been in evidence for the last 70 ft. The No. 4 lode, which this undoubtedly is, was reached in the shaft at a depth of about 3100 ft., and showed copper in commercial quantities. Shaft sinking continues from a depth of about 3385 feet.

Iron

Oliver Iron Mining Co.—A diamond drill is being operated on Sec. 2, 42-35, near Iron River, where two "forties" are held by this company, lying west of its Dover mine.

McGreevy—Two drill holes have been sunk on Sec. 29, 43-34, and prospecting is being done on the May tract on Sec. 20. Both of these Iron River explorations are north of the Rogers mine of the Rogers Brown company.

M. A. Hanna & Co.—A temporary hoist will be installed at the Carpenter property in the Crystal Falls district preparatory to sinking. The shaft will be 12x18 ft. and will be lined with timber; it will be sunk with four compartments. The overburden is 85 ft. thick at the shaft site and it is anticipated that considerable water will be encountered. In preparation for this a permanent steam plant will be installed at the start so that adequate pumping facilities will be available. Wickes mechanical-stoked boilers will be used.

Bristol—At this Oglebay-Norton mine at Crystal Falls only a small proportion of the stockpile is now left, and the steam shovel has been sent to the Iron River mine of the company.

Corrigan, McKinnev & Co.—At Crystal Falls, the Dunn and Tobin stockpiles are

cleaned up, also all of the Armenia stockpile except a small one of its second-class ore. The first two mines are shipping ore from pockets.

Mansfield—At this mine of the Oliver Iron Mining Co. in the Crystal Falls district, the ore is being put on the stockpile as it is hoisted.

Cleveland-Cliffs Iron Co.—It is the plan of this company to equip all its Marquette and Swanzy Range mines with electrically operated machinery. At present the North Lake, Negaunee, Princeton, and Smith mines have been so equipped, although the last two properties are idle; steam power is still in use at the Maas, Cliffs Shafts, Austin and Stephenson mines.

Minnesota

Mesabi Range

Buffalo—Four more shovels are now working in ore at this mine.

Arthur Iron Mining Co.—The Winston-Dear company has four steam shovels on the ground at the Sec. 27 property of this company in Chisholm district. Only two shovels are working at the removal of overburden at present, but two more shovels will be put in commission in a few days. These are new shovels recently received from the manufacturers and are the most uptodate machines on the range. New cars and locomotives have been ordered. It is the intention to work all winter. The overburden formation is largely clay which can be worked to good advantage during cold weather.

Rogers-Brown—It is reported that 50 more men are to be added to the force at each of the mines of this company.

Crosby—A small force of men is at work getting things in shape for working a large force during this winter. About 20,000 tons of ore remains to be shipped from the stockpile; then work will be started underground.

Missouri

Joplin District

Richinore—The ore at this mine at Thoms Station has changed recently from galena to blende, necessitating a change of milling methods.

Weneta Pearl Mining Co.—A drill strike of unusual richness was recently made by this company on the Clark and Ward land. Ore was found between depths of 90 and 135 ft., and 135 and 150 ft. The cuttings assayed high in zinc.

Alice of Old Vincennes—A prospecting company has opened a good face of ore in this mine at Chitwood. At present the ore is being treated on hand jigs, but a mill will be built if development justifies the expense.

Continental—H. B. Crossman is carrying on drilling operations on a lease of this property near Carterville, for Johnson & Bruce, and new strikes have been made near the mines of the American Lead, Zinc & Smelting Co. An upper sheet ground formation was found at 190 ft., extending to 198 ft. Beneath was a foot or so of barren chert and then a 10-ft. face of lower sheet ground richer than the upper run. The holes are being sunk 500 ft. apart.

Newsboy—This old mine at Duenweg is being reworked. A shaft has been sunk 239 ft. by the side of an old cave-in and a good face of ore has been found above the old workings.

Lucky Ben—This mine on the Clark land five miles west of Sarcoxie is proving to be a good prospect. It is in virgin territory and the shaft is 142 ft. deep. The ore is ruby jack in clean ground.

Eureka—The Eureka mill on the Crown Crest land is in operation after a campaign of drilling. Ore is found from 102 to 180 ft. deep at this Duenweg property.

S. Y. Ramage Mining Co.—This company is sinking a large shaft on the Burch land at Duenweg, following several rich drill strikes.

Little Bob—This mine at Duenweg belonging to Chapman and Lennan is proving to be a good producer. A 200-ton mill is being operated on ore from three shafts.

Montana

Butte District

Davis-Daly—The crosscut being driven northwest from the Colorado shaft on the new 1900-ft. level, has encountered a vein, 410 ft. from the shaft. This is the same vein upon which mining is being done on the 1700-ft. level. The width and quality of the ore is about the same on both levels. The crosscut from the Gagnon mine of the Anaconda company is being advanced steadily into the western territory of the Davis-Daly company. The recent strike made by lessees operating the Silver King mine of the Davis-Daly company is being explored with satisfactory results.

North Butte—Rich ore was recently encountered on the 2400-ft. level of the Speculator mine, southeast of the shaft, on what is believed to be the real Edith May vein. While crosscutting south on this level to the High Ore mine workings, a vein badly faulted and broken up, which was at that time believed to be the Edith May vein, was encountered. A drift was driven west but the same faulted condition continued, and as the ore was of a poor grade, drifting was stopped. Then the crosscut was advanced again toward the High Ore mine, and several stringers were cut. A drift was driven with the result that a strong vein between unbroken walls was discovered. This is believed to be the true Edith May vein and there is strong reason to think that it exists on the levels above, where it was overlooked, owing to the fact that the same faulted vein material was found and believed to be the Edith May. Drifting will at once be started in both directions on the vein.

Anaconda—At the Badger State mine, of the Anaconda company, about 700 tons of ore is being hoisted daily and about 300 men are employed. The concrete foundations for the new chippy hoisting engine have been completed and the engine will be installed soon. The new extension of the combined office building and will be ready for occupancy in about a month. The surface ore bins have been and change house is nearing completion enlarged to nearly double the former capacity by an addition built on the north end, and a tramway has been laid from the north end to the collar of the shaft. The Emily shaft is being sunk two compartments wide, and is about 900 ft. deep. Preparations are being made to raise from the 1300-ft. level of the Badger State to meet the sinking force in the Emily, and a crosscut is being driven to a place underneath.

Tuolumne—This company is shipping about 35,000 tons of ore monthly to the Washoe smeltery, most of it coming from the 1600- and 1800-ft. levels. The ore on these two levels has been of lower grade than on the levels above, and in this respect it has been similar to the adjoining properties, which, upon sinking deeper, found much improved conditions. The shaft is being sunk, and has reached a place below the 1900-ft. level. It will be continued to the 2000 and possibly to the 2200-ft. level before stations are cut and development work begun. A portion of the Jessie vein, upon which the North Butte company recently made a rich strike on the 2400-ft. level, may be found to pass through a part of the Tuolumne ground, and as the North Butte 2400-ft. level corresponds to the Tuolumne company's 2200-ft. level, it is likely that the same orebody will be found in the latter property with development on that level.

Fergus County

Barnes-King—It has been announced that operations will be commenced at once on the lately acquired North Moccasin property at Kendall. George T. McGee, general manager.

Jefferson County

Norma—At a meeting of the stockholders in Butte, Aug. 20, the following officers were elected: W. J. Swartz, of Butte, president; Norris Climer, vice-president; A. B. Keith, treasurer. Three directors were elected: Henry Hopkins and William Bailey, of Butte; and John Mackin. The company owns eight claims at Clancy, and is doing development work by tunneling with satisfactory results.

LEWIS & CLARK COUNTY

General Sherman—It is likely that this mine, situated on the west fork of Prickly Pear Creek, in the Empire district, may be reopened after 20 years of inactivity. A. J. Seligman, of New York, owner.

Nevada

ESMERALDA COUNTY

Goldfield Consolidated—The official estimated production for August is as follows: Tons of ore mined, 32,480; gross value of gold recovered, $426,000; operating expenses, $195,000; and net realization $231,000.

EUREKA COUNTY

A new tariff will go into effect on the Eureka-Nevada R.R. within a few days, bringing a much needed relief in the form of a reduction in rates. Among the reductions are, flour in carload lots from $10 to $7.60 per ton and in less than carload lots from $20 to $10 per ton. Distillate in drums from $8 to $4.50 per ton. All ore rates have been reduced, but no figures have yet been given out.

Buckhorn Mines Co.—For the last two years work has been confined to development of ore. It is now planned to open and actively work this property at once. Power will be generated at Beowawe, on the Southern Pacific and Western Pacific railways and a transmission line run from there to Buckhorn, a distance of about 28 miles. A long tunnel has been started and the mill will be erected near the portal. Stock in the company is closely held by George Wingfield and associates. Construction of a spur line from Blackburn station on the Eureka-Nevada R.R. has been started.

LINCOLN COUNTY—PIOCHE DISTRICT

Home Run Copper Co.—Development work on the property recently acquired in the Bristol district has opened copper-silver ore, occurring in caves in the lime. Three carloads have been shipped. For preliminary work, a 9-hp. Fairbanks-Morse gasoline engine is being used, but the company will soon install a heavier engine and a compressor. Ore is hauled 12 miles by wagon to the Pioche-Pacific R.R.

Virginia-Louise—This company, organized last year, owns property adjoining the Prince on the South, where it is sinking a vertical shaft near the Prince end line. For the last 100 ft. it has been going through a bed of manganese ore, and at a depth of 250 ft. kidneys of rich silver-lead ore are being found in the manganese. A 20-hp. Fairbanks-Morse gasoline engine is in use at present, but a steam plant will be installed before shipments are commenced.

NYE COUNTY

Shipments in tons from Tonopah mines to date and for the week ended Aug. 29, are as follows:

Mines	Week	Year to Date
Tonopah Mining	3,000	116,819
Tonopah Belmont	3,091	78,942
Montana-Tonopah	1,159	36,092
Tonopah Extension	1,065	34,633
West End	835	25,454
Midway	.....	420
MacNamara	450	12,302
North Star	.....	130
Mizpah Extension	.....	40
Jim Butler	300	700
Totals	9,900	305,532
Estimated value	$250,000	.....

New Mexico

OTERO COUNTY

J. J. Murray, of Oro Grande, is about to renew work on the placer deposit, near Lucky Flats.

E. T. Becham and associates, of El Paso, are prospecting the old Lucke and Lincoln properties, belonging to New York men, with the idea of taking them over under lease and bond.

By Chance—Several cars of ore have been shipped to the El Paso smeltery. A new hoisting plant was recently installed. The ore contains on the average about 2½% copper and about ¼ oz. of gold. R. B. Hutchinson is consulting engineer.

Garnet—From this group of claims, west of the By Chance, about 200 tons of 3% copper ore is being shipped monthly. A hoist was recently installed, and it is the intention of the owners to begin the erection of a concentrator in the near future. E. B. Baker, Lucky Flats, is manager.

SOCORRO COUNTY

Ernestine Mining Co.—During the first 20 days of August, 18,160 oz. of gold and silver was recovered and nine tons of concentrate was saved. Between August 20 and 27, 750 tons of ore was treated.

Socorro Mines—The water recently encountered on the 500-ft. level of the Queen vein is now completely under control and the lower levels have been drained. An average of 150 tons of ore is being treated in the mill each day, a small portion of which is custom ore.

Deadwood Mine—New bins for custom ore are being built. Machinery for an automatic sampler has been shipped.

Mogollon Gold & Copper Co.—The Little Charley mine of this company is producing 15 tons of milling ore per day in addition to some high-grade shipping ore. Work may be started soon on some of the other properties of this company.

Oaks Co.—From the Pacific mine of this company 90 tons of ore was shipped recently to the Deadwood mill. This was produced from one week's development work. The Johnson mine yielded 31 tons of ore in the same time.

Utah

BEAVER COUNTY

There has been some shortage of railroad cars lately, on account of the increased activity in mining.

Horn Silver—During August this company shipped 50 cars of lead-silver ore and six cars of zinc ore. Leasing is being discontinued, and only five leases are being worked at present. There are 110 men employed on company account.

South Utah—During June and July, half of the mill was closed for alterations and repairs, according to the company's report. The production was reduced, the cost increased, and there were no profits. August operations are understood to have been somewhat more favorable. The grade of ore handled in June was 1% copper, and in July 1.13%. There has been some disposition on the part of shareholders to call for a report on mine and mill conditions.

Majestic—During August this company marketed about 40 cars of ore, largely copper. This came from the Old Hickory with some silver-lead ore also from the Harrington-Hickory. A 4-mile railroad spur was recently built, eliminating the wagon haul to Milford, and reducing the cost of production. The July output amounted to 28 cars. New machinery has recently been installed, and the large compressor will allow the company to operate six or eight drills, as compared to four formerly used.

North American—This property, in the Lincoln district, has recently been reorganized. C. W. Corfield is president. The company owns four claims covering the contact of limestone and granite. Silver-lead ore occurs along the contact and in the cross-fissures. Little development has as yet been done, but work is soon to be undertaken.

Beaver Butte—Stringers of ore rich in gold have been cut recently on this property, which adjoins the Sheep Rock on the south.

Granite Copper—A contract for 600 ft. of work has been let on this company's King of the Hills group, in the Granite district. Tunneling will be continued from the face of a 230-ft. adit, about 350 ft. below the surface. A shaft, sunk on the contact of limestone and granite, opened low-grade copper ore.

JUAB COUNTY

Tintic shipments for the week ended Aug. 23 amounted to 155 cars.

Uncle Sam—At the adjourned meeting the capitalization was increased from 500,000 to 750,000 shares. Of this increase, 200,000 shares will be retained in the treasury, and 50,000 are to be used for taking over the 100,000 shares of Richmond-Anaconda stock outstanding. The Uncle Sam owns 400,000 out

of the 500,000 Richmond-Anaconda shares, and at a meeting of the Richmond-Anaconda stockholders, following the meeting of the Uncle Sam, the exchange on the basis of two shares for one of Uncle Sam was approved.

SALT LAKE COUNTY

Utah Copper—Twenty thousand tons of ore are being treated daily by the Garfield mills. The output for the first seven months of 1912 amounted to 64,461,413 lb. copper, as compared to 53,193,216 lb. during the same period of 1911. Ore running between 2 and 3% copper is reported to have been cut recently by one of the prospecting drills.

New Bingham—Articles of incorporation have been filed for this company. The capitalization is $100,000, divided into shares of 20c. par value. Frederick Eberhardt is president.

Ohio Copper—The third unit of the mill has been started, but has not yet been brought up to capacity. It is reported that about 2400 tons per day is being treated, compared to the former output of 2000 tons. Chilean mills will be used in the third unit.

TOOELE COUNTY

Consolidated Mercur—The annual report is being prepared, and it is stated that net earnings of approximately $10,000 will be shown.

Canada

BRITISH COLUMBIA

Consolidated Mining & Smelting Co.—This company, operating mines near Rossland, recently purchased the Iron Horse claim which adjoins the company's other properties on the east, and which gives it additional ground along the strike of the main Le Roi-Center Star vein. There is a shaft on the claim 100 ft. deep and some lateral workings on the 65-ft. level. The aërial tramway, formerly used to convey the ore from the Le Roi mine to the ore bins on the Red Mountain Ry., has been taken down and shipped to Ainsworth. It will be erected again at No. 1 mine and used to transfer ore from that property to barges on Kootenay Lake. The No. 1 mine, at Ainsworth, has been purchased by the company and several smaller properties have been taken under bond and lease. Ore from these mines is now being shipped to the Trail smeltery.

Blue Bird—Since the installation of the air compressor at this property last month, work has been resumed in the shaft.

Phoenix—Three men are now working on this lease for Mathew Trewhella, who is sinking a small shaft on a vein of chalcopyrite that carries some gold. Two carloads of ore have been shipped to the Trail smeltery.

ONTARIO—COBALT

Shipments of ore and concentrates, in tons, from Cobalt for the week ended Sept. 7, and for the month of July are:

Beaver	.....	244.26
Buffalo	65.36	803.75
Casey Cobalt	.....	212.15
City of Cobalt	.....	887.99
Cobalt Lake	32 15	586.91
Cobalt Townsite	38.81	1,142.98
Chamb.-Ferland	.....	289.05
Coniagas	163.95	1,515.41
Crown Reserve	.....	351.10
Drummond	.....	330.30
Hudson Bay	.....	502.86
Kerr Lake	.....	529.92
La Rose	32.60	2,415.79
Lost and Found	.....	15.00
McKinley-Darragh	41.80	1,843.79
Nipissing	.....	1,527.77
O'Brien	.....	345.62
Penn.-Canadian	.....	29.70
Provincial	.....	22.22
Right of Way	32.20	242.82
Timiskaming	.....	744.93
Trethewey	.....	353.89
Wettlaufer	36.70	265.74
Colonial	.....	63.14
Totals	443.58	15,317.12

ONTARIO-COBALT

Cobalt Lake—The record production was reached in July when 100,000 oz. was shipped. A large part of the output was from the rich vein in the No. 4 shaft. The August production is estimated at 120,000 ounces.

Timiskaming—A carload of ore has just been shipped which will meet the dividend requirements for this quarter. The No. 6 vein has been found on the 575-ft. level and still carries rich ore.

Cobalt Central—Developments continue to be favorable and good ore is being opened on the lowest level.

Bailey—This property will rank among the "come-backs," having developed consistent bodies of high-grade ore for the first time in its history.

Green-Meehan—An offer for the purchase of this property has been made.

ONTARIO-PORCUPINE

Lucky Cross—Ground has been broken for a 10-stamp mill on this Swastika property.

Dome—A double-drum electric hoist is to be installed at the head of the incline to handle the ore from the 45- and 100-ft. levels. Trouble has been experienced in discharging the tailings from the mill, and a tailings wheel will be installed.

Mexico

BAJA CALIFORNIA

Progreso Mining Co.—At this mine at Triunfo, experiments are being made to determine the proper treatment for the refractory gold-silver ore. Indications are that heavy stamps will be used to crush through coarse screens, the product to be sized and the undersize to be concentrated. The oversize will be passed through tube mills. Tailings from the concentrator will be recrushed in another tube mill and treated directly in Merrill presses. These are the tentative plants only. Arthur C. Nahl is manager.

HIDALGO

Santa Gertrudis—The suit against this company commenced in Mexico about two years ago by the Recuperadora company has been dismissed by the higher court of Mexico.

SONORA

Much damage has been done to the railroads by the Yaqui Indians and rebels. Supplies are short in many places and will probably cause a temporary shutdown of some of the more isolated mines.

Creston-Colorada—Since Jan. 1, 1912, this company in the Minas Prietas district, has mined and milled 138,700 tons of ore, recovering 256,000 oz. silver and $293,000 gold; 120,020 tons coming from the Creston and 18,680 tons from the Colorada mine. A break occurred in the gearing of the hoist at the West shaft of the Creston. While repairs were being made, the ore was hoisted through the old shaft. The pumps have been removed from the 1022-ft. and installed on the 722-ft. level. Development work is being pushed on the 622-ft. level, on a vein recently opened up, called the East vein. Six machine drills are on development and assays show a good grade of milling ore, averaging in width about eight feet. At the Colorada a large body of milling ore has been developed within the last few months; some rich gold-silver ore was extracted from stringers in the main vein. The old Colorada incline shaft is being retimbered, and a new headframe, electric hoist, ore bin and rock breaker are being installed. A surface tram 800 ft. long is being built to convey the ore from the shaft to mill.

Zubiate—This mine is 12 miles north of Minas Prietas. The Mines Company of America has an option on the property and is removing the water and sampling the mine. This mine has been a rich producer of silver in past years, but has been idle for about seven years; depth of old workings 650 ft. perpendicular.

Lapiz—This mine, about 15 miles south of Minas Prietas, is being worked steadily. A gas engine, electric generator and electric pumps are being installed with the purpose of pushing development on the lower levels. This mine is one of the largest producers of high-grade graphite. The property is owned by the U. S. Graphite Co. of Saginaw, Mich.

Tarasca—This mine is in the Hermosillo district and near Torres station on the Sonora Ry. A 3-ft. vein carrying native silver has been cut in one of the crosscut tunnels and raises and drifts are being pushed on the orebody.

Asia

CHOSEN

Oriental Consolidated Mining Co.—The cleanup for August was $136,000.

The Market Report

Current Prices of the Metals, Minerals, Coal and Mining Stocks

Coal Trade Review

New York, Sept. 11—Anthracite collieries are still hard at work to catch up with the demand and fill orders on time. The figures below show heavy production for August and this probably cannot be increased unless more labor and more cars can be had.

The seaboard bituminous trade is in fair shape, demand being good and prices rather firm. The coastwise trade is increasing in activity.

The coal trade in the West is active, the demand for steam coal being good. Prices are fairly firm though they are rather kept back by large production. Some of the West Virginia mines are still disorganized by labor troubles.

The Southwestern Interstate Coal Operators' Association reports shipments for the five months ended May 31 as follows, in short tons:

	1911	1912	Changes
Missouri.....	973,981	1,336,782	I. 362,801
Kansas.....	1,905,828	2,183,406	I. 277,578
Arkansas.....	532,712	718,531	I. 185,819
Oklahoma.....	930,000	1,223,795	I. 293,795
Total.....	4,342,521	5,462,514	I. 1,119,993

Total increase this year was 21%. These shipments cover over 90% of the coal mined in the states named.

Anthracite shipments in August were 6,576,591 long tons, the heaviest ever reported in a single month, and 1,044,795 tons more than in August, 1911. For the eight months ended Aug. 31 the total shipments were 45,645,444 long tons in 1911, and 38,958,723 in 1912; a decrease this year of 6,686,721 tons, or 14.6%. The heavy tonnages of June, July and August have not yet made up for April-May stoppage.

Iron Trade Review

New York, Sept. 11—The only change apparent in the iron and steel markets is some cessation of the rush of new orders. This is probably due to discussions over price and the unwillingness of makers to contract far into 1912 just yet. Specifications on contracts continue heavy and the mills are pressed for deliveries everywhere.

The statistics issued by the American Iron & Steel Institute for the first half of 1912—given on another page—show record productions of steel and of many lines of finished materials.

The National Tube Co., under date of Sept. 10, issued a new list of discounts on merchant steel pipe, by which several sizes, particularly of galvanized, are advanced from one to three points, or $2 to $6 a ton, other sizes being unchanged. The average advance is probably in excess of $1 a ton on the whole list. The rearrangement is stated to be due to a desire to bring the discounts on different sizes more in harmony with the actual cost of manufacture. Steel boiler tubes under the same date are advanced one point throughout the list, equivalent to $2 a ton.

The statement of the United States Steel Corporation, of 6,163,375 tons of unfilled business at the close of August, indicates an increase during August of 206,296 tons, which is equal to about 18% of the corporation's capacity for the month. Its shipments were presumably between 90 and 95% of capacity, so that its bookings, being about 18% heavier than its shipments, must have run considerably beyond maximum capacity, or more than could be made in August, even though the entire theoretical capacity was in operation, for an account of the heat, the labor scarcity and the car shortage, which is being felt still more, the full capacity could not be realized.

Pig-iron sales continue large, though some large foundry interests are out of the market for the time being, having provided for their wants for some time ahead. There is a demand for foundry iron still, notwithstanding this condition, while basic iron is called for largely. Furnace production is increasing slowly, the supplies of coke and labor being limiting factors.

Pig-Iron Production—The reports of the blast furnaces, as collected and published by *Iron Age*, show that on Sept. 1 there were 257 coke and anthracite furnaces in blast, having a total daily capacity of 82,100 tons; an increase over Aug. 1 of 3400 tons. Making an allowance for the charcoal furnaces, the estimated production of pig iron in the United States in August was 2,539,125 long tons; for the eight months ended Aug. 31, it was 19,048,625 tons. Of this total approximately 14,085,800 tons, or 73.9%, were made by steel works furnaces.

Baltimore

Sept. 9—Exports for the week included 226,169 lb. miscellaneous steel to Havana; 4,192,760 lb. billets and tinplate bars to Liverpool.

Birmingham

Sept. 9—Pig-iron prices in Southern territory are showing an inclination to advance. The general market conditions are strong and there are inquiries for iron to be delivered on during the first half of next year. Quotations of iron for delivery during the last three months of this year are on a basis of $12.50@13 per ton, No. 2 foundry. The $13.50 price is being asked for iron to be delivered during the second quarter of 1913. The Southern furnace companies have been selling their product steadily. The recent orders stipulate delivery during the last quarter of this year, though a few scattering trades are for next year's delivery. The cast-iron pipe companies continue to look after needs for next year. It is announced that the pipe demand is heavy and no time is being lost in the operation of plants. The American Cast Iron Pipe Co. is operating its Birmingham plant on double turn.

Foundries and machine shops report a little improvement in business, with labor troubles still being felt.

The make of both foundry and charcoal iron is being increased. One blast furnace was blown in this month and two others are almost ready. One charcoal furnace will be started up the last of the month, to produce about 60 tons of iron daily.

Scrap iron holds its own with very little change in demand and quotations.

Chicago

Sept. 10—Buying of pig iron has been active in the last week, with the result that prices are now firm and at least Northern foundry iron will advance 50c. within the current week. The sales of the last week have been made at $16@16.50 for Northern No. 2 foundry, which means about $16.50@17 Chicago, and $12.75@13.25 Birmingham for Southern No. 2 foundry, which means $17.10@17.60 Chicago. Sales agents for Southern hold out stiffly now for $13 on last-quarter and first-quarter deliveries. Charcoal iron is in good demand at $16.75, Chicago.

The buying of pig iron is chiefly for first quarter; there is still a considerable sale of small lots for last-quarter needs, at practically the same prices on the average, though some lots bring the low prices quoted. In general, the week's sales have been of small to medium lots—250 to 2000 tons, the aggre-

gate having been satisfactory to the sales agents. Some disposition exists among the larger users of iron to contract for first-half needs, but the more general practice is to provide for the first quarter.

In the finished material market the demand continues large, but there is much doubt as to 1913 contracts and in many lines new business for the rest of this year cannot be taken because of the pressure on the mills. Iron bars on several sales have brought more than the 1.40c. nominal quotation; soft steel bars hold to 1.48c. and are likewise in heavy demand. Railroad supplies are very much in demand, both standard rails and fastenings, but the larger contracts for next year's deliveries are said to be yet held off. Structural material is much sought, but mills are so crowded as to make deliveries doubtful. Sheets, plates and wire goods continue active and prices are firm.

Cleveland

Sept. 9—Ore shipments in August were heavy, in spite of bad weather. Some shippers have had to hire wild boats, and such boats are now asking advances on contract rates.

Pig Iron—August sales were large and business continues active. Prices are advancing. Bessemer is now quoted $15.65 and No. 2 foundry $15, Cleveland delivery.

Finished Material—The mills are finding difficulty in shipping as fast as material is wanted. They are not willing yet to make contracts running into next year. Steel bars are in special demand. Jobbers report heavy trade.

Philadelphia

Sept. 17—Buyers and sellers have drawn apart, sellers because they have booked all the business they care to take at the present time under existing conditions and buyers because they find it difficult to place orders at prices they are willing to pay. There is a good deal of business that needs to be placed soon. The market is taking a breathing spell and buying must shortly be resumed on the best terms consumers can make. A good many purchasers who placed orders a month or more ago are unable to get iron according to contract. All foundries are either in the market or would be if they could get in. Southern furnaces monopolize the current business. Basic-iron transactions are pending for large lots and makers are quoting the outside figure of $16.50. The recent heavy transactions in forge leave the market with very few inquiries. The situation is one of delay until conditions shape up differently. No. 2 X foundry is quoted as high as $16.75; gray forge $16, basic $16.50, and low phosphorus $21.50 per ton.

Steel Billets—Large transactions in billets are promised with premium prices ruling. Forging billets have advanced to $30, bottom price, with $31.50 in one recent sale for early delivery. Rolling billets have moved up to $25.40 with probabilities of an advance.

Bars—Bars have moved up fractionally on early deliveries to 1.45c. for steel and 1.47½c. for iron. Jobbing demand has picked up but there is difficulty in accommodating all buyers, owing to the urgency for delivery.

Sheets—Several buyers of sheets are now awaiting the action of manufacturers as to deliveries, the question of price not being brought up.

Pipes and Tubes—Wrought-iron pipe has advanced $2 per ton but this does not represent the actual price paid in two or three recent cases. Premium prices have been paid on orders for tubes.

Plates—Large orders have been placed for steel plates and these represent only a small percentage of the inquiries that are crowding in. Much business is being done at premium rates and a formal advance is close at hand. Sheared plates 1.55c. with 1.65c. for universal.

Structural Material—Today's quotations on paper are 1.65c. and inquiry has lightened up, but there is a great deal in the way of negotiation.

Scrap—Scrap is active at advancing prices, especially for railroad, heavy melting steel, No. 1 yard scrap and old iron rails.

Pittsburgh

Sept. 10—September has produced no marked change in the finished-steel trade, there being a continuance of the heavy specifications, in excess of current shipments, whereby mills are falling still farther behind in shipments in several of the important products. This is particularly true in the sheet trade, in which several of the producing mills are actually trying to buy sheets, some being in the market for galvanized, and others for black sheets, both for early delivery. There is very little of such material to be had, and the sheet mills are advancing their prices on such deliveries as they can make, generally in November and October. Practically all the independent tinplate mills have advanced their price on tinplate $2 a ton to $3.60 a box, but as they are sold up for this year and are not yet willing to sell for next year, the action is not of striking importance.

The iron and steel market locally shows no material change from last week, except for the stronger market in sheets and advances in certain descriptions of tubular goods. As wired briefly last week, the independent tinplate mills started advancing their price 10c. per box to $3.60, and this advance quickly became general. Independent sheet makers have been making slight advances here and there for two or three weeks, and this week the advancing tendency has become quite general, eight or ten independents being understood to have advanced their prices on black sheets $2 a ton from 2.05c. to 2.15c., and on galvanized $3 a ton from 3.15c. to 3.30c. It is likely that by the end of the week the advance in sheets will have become general.

Pig Iron—Quotations on bessemer and basic are higher, although actual transactions have been light, and it is a question what would occur on actual transactions involving large tonnages. It is claimed that higher than $15 has been asked on bessemer, and as high as $14.50 on basic, against last week's quotations of $14.75@15 on bessemer and $14@14.25 on basic. There seems to be little unsold tonnage for this year, but very few additional merchant furnaces are in position to blow in, nearly all the available merchant capacity being already in operation in the general Pittsburgh district. We quote: Bessemer, $15; basic, $14@14.50; No. 2 foundry, $14.25@14.50; forge, $13.75@14; malleable, $14@14.50, all f.o.b. Valley furnaces, 90c. higher delivered Pittsburgh.

Ferromanganese—The market has been relatively quiet as to contract buying since the $2.50 advance of a fortnight ago, but there is considerable demand for prompt, which frequently brings premiums. We quote the market at $53.50@55 for prompt and $53.50 for contract, f.o.b. Baltimore.

Steel—There is very little steel to be had and fancy prices are frequently paid for early deliveries, frequently involving fairly large lots. Regular quotations, at which it is difficult to buy, are approximately as reported last week: Bessemer billets, $23@23.50; bessemer sheet bars, $23.50@24; openhearth billets, $24@24.50; openhearth sheet bars, $24.50@25; rods, $25.50@26, f.o.b. maker's mill, Pittsburgh or Youngstown. Several of the large mills are practically out of the market for this year's delivery, while none of the mills is quoting for next year as yet.

Sheets—As noted, the independents have been advancing prices, and eight or 10 have marked up their prices $2 a ton on black and $3 a ton on galvanized. Others are practically out of the market, so that the market seems fairly quotable at the advance. The mills are from six to ten weeks behind in deliveries and at the recent rate of specifying they will be kept busy on contracts throughout the year, without making any fresh sales. Thus far there is practically no selling for next year. Some buyers are trying to buy additional tonnages, ostensibly for this

year, but in the knowledge that if the material were specified late in the year it would not be delivered until next year. We quote black sheets, 28 gage, at 2.15c.; galvanized, 28 gage, at 3.25@3.30c.; blue annealed unchanged at 1.50c.; painted corrugated, 28 gage, 2.30@2.35c.; galvanized corrugated, 3.30@3.35c. for 28 gage.

St. Louis

Sept. 9—The market for the past week has been on the "up-turn" considerably. A number of buyers have come into the market for both last- and first-quarter delivery. Producers are quoting for Southern No. 2, $12.50 Birmingham, or $16.25 St. Louis, on last-quarter delivery and $13 Birmingham, for next-year's delivery, or $16.75 St. Louis. Founders are buying mostly in small quantities and often. Northern iron is quiet and is bringing around $15.50 for No. 2 Foundry. Good foundry coke is bringing around $5.40 St. Louis.

Iron Ore Trade

Total shipments of iron ore from the Lake Superior region in August were 7,760,248 tons, the heaviest for any month this year. For the season to Sept. 1, the totals were 19,606,268 tons in 1911, and 29,051,152 in 1912; an increase of 9,444,884 tons, or 48.2% this year.

Sales of Cuban ore to merchant furnaces in the East are estimated at 200,000 tons. This is the first year that Cuban ore has been offered on the market in any considerable quantity.

Foreign Iron Trade

Exports and imports of iron and steel and of machinery in Great Britain, seven months ended July 31, as valued by the Board of Trade returns, were:

	Exports	Imports	Excess
Iron and steel	£25,727,345	£6,878,122	Ex. £18,849,223
Machinery	18,447,691	3,981,186	Ex. 14,466,505
Hardw're, etc.	6,864,037	4,445,593	Ex. 2,418,444
New ships	3,134,990	.....	Ex. 3,134,990
Total	£54,174,063	£15,364,901	Ex. £38,869,162
Total, 1911	52,326,657	13,767,808	Ex. 38,558,849

Increase in total exports this year, £1,847,406; increase in imports, £1,537,093. The quantities of iron and steel were, in long tons:

	1911	1912	Changes
Exports	2,585,894	2,678,062	I. 92,168
Imports	1,026,750	1,069,334	I. 42,584

Increase in value of exports this year was mainly in machinery and hardware.

German Iron Trade—Exports and imports of iron and steel, and of machinery, in Germany, six months ended June 30, metric tons:

	Exports	Imports	Excess
Iron and steel	2,928,130	326,653	Exp. 2,601,477
Machinery	247,138	44,127	Exp. 203,011
Total	3,175,268	370,780	Exp. 2,804,488
Total, 1911	2,699,759	339,898	Exp. 2,359,861

The total increase in exports was 475.509 tons.

Metal Markets

New York, Sept. 11—The metal markets have been generally active and stronger, while consumption appears to be increasing.

MONTHLY INDEX NUMBERS

Month	1911	1912	Month	1911	1912
January	110	111	July	112	114
February	115	109	August	117	120
March	112	111	September	111	.....
April	114	115	October	112	.....
May	118	118	November	111	.....
June	115	117	December	110	.....

Year 1909, 115; 1910, 115; 1911, 112.
Numbers for each month and year calculated on approximate sales of pig iron, copper, tin, lead, zinc and aluminum.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal	Exports	Imports	Excess
Gold			
July 1912	$ 7,263,624	$ 3,747,869	Exp. $3,515,755
" 1911	2,178,088	2,594,653	Imp. 416,565
Year 1912	40,660,460	29,012,211	Exp. 11,648,249
" 1911	15,429,650	36,367,679	Imp. 20,938,029
Silver			
July 1912	6,591,054	3,449,716	Exp. 3,141,338
" 1911	5,275,008	3,920,794	Exp. 1,354,214
Year 1912	40,260,276	28,713,965	Exp. 11,546,311
" 1911	39,718,211	25,881,395	Exp. 13,836,816

Exports from the port of New York, week ended Sept. 7: Gold, $7415; silver, $1,255,743, to London and Paris. Imports: Gold, $324,362; silver, $146,850, chiefly from Mexico and South America.

Gold—The price of gold on the open market in London remains at the Bank level, 77s. 9d. per oz. for bars, and 76s. 4d. per oz. for American coin. There is some talk in London and Paris of probable exports of gold to New York at an early date.

Iridium—This metal is quoted at $63@64 per oz., New York.

Platinum—Prices hold steady, both here and abroad, and no change is reported. Dealers here ask $45.50 per oz. for refined platinum and $48 per oz. for hard metal.

Our Russian correspondent writes, under date of Aug. 29, that there is little change. Foreign demand is insignificant for the present, and no business is being done at St. Petersburg. From Ekaterinburg, it is reported that speculative purchases have kept up the price. The offer of platinum by the starateli is increasing, many miners having left the gold mines in the Urals for the platinum placers. Quotations for crude metal, 83% platinum, at Ekaterinburg, are 9.8 rubles per zolotnik—equal to $36.85 per oz.; at St. Petersburg, 37,300@37,500 rubles per pood—equal to $36.65 per oz., average.

Silver—The market has ruled dull and steady the past week. China has been out of the market, but India Bazaars have been steady buyers. Crop prospects in India and China continue good and the outlook for silver demand is favorable.

SILVER AND STERLING EXCHANGE

September	5	6	7	9	10	11
New York	62⅝	62⅝	62⅝	62⅝	62⅝	62⅝
London	28⅝	28⅞	28⅞	28⅝	28⅝	28⅝
Sterling Ex.	4.8655	4.8640	4.8640	4.8630	4.8610	4.8595

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Exports of silver from London to the East, Jan. 1 to Aug. 29, as reported by Messrs. Pixley & Abell:

	1911	1912	Changes
India	£5,292,700	£5,892,700	I. £600,00
China	949,700	933,500	D. 16,20
Total	£6,242,400	£5,826,200	I. £583,800

Imports of silver into Great Britain, seven months ended July 31, were £8,894,802—of which £7,205,866 is credited to the United States. Exports were £8,114,851; excess of imports £779,957, which compares with an excess of exports of £1,156,996 last year.

Copper, Tin, Lead and Zinc

NEW YORK

September	Copper: Lake, Cts. per lb.	Copper: Electrolytic, Cts. per lb.	Tin: Cts. per lb.	Lead: New York, Cts. per lb.	Lead: St. Louis, Cts. per lb.	Zinc: New York, Cts. per lb.	Zinc: St. Louis, Cts. per lb.
5	17⅛ @17¾	17.52½ 17.57½	47½	4.85	4.75 @4.77½	7.30 @7.40	7.15 @7.25
6	17⅛ @17¾	17.52½ 17.57½	47½	4.85	4.75 @4.77½	7.35 @7.40	7.20 @7.25
7	17⅛ @17¾	17.52½ 17.57½	47½	4.85	4.75 @4.77½	7.35 @7.40	7.20 @7.25
9	17⅛ @17¾	17.50 17.55	48	5.10	4.95 @5.00	7.35 @7.45	7.20 @7.30
10	17⅛ @17¾	17.50 17.55	48¼	5.10	4.97½ @5.00	7.40 @7.45	7.25 @7.30
11	17⅛ @17¾	17.50 17.55	48¼	5.10	5.00 @5.02½	7.40 @7.45	7.25 @7.30

The quotations for copper, lead, spelter and tin are for wholesale contracts with consumers, without distinction as to deliveries; and are representative, as nearly as possible, of the bulk of the transactions, reduced to basis of New York, cash, except where St. Louis is specified as the basing point. The quotations for electrolytic copper are for cakes, ingots and wirebars. The price of electrolytic cathodes is usually 0.05 to 0.10c. and that for casting copper usually about 0.125 to 0.2c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market for good ordinary brands, both desilverized and non-desilverized; specially refined corroding lead commands a premium. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—The market is without special feature. There is a fair demand in this country, which is being freely met, while European buyers are still holding aloff, their previous purchases evidently having been larger than generally supposed. However, the cables report that refined copper for near-by delivery is scarce, and it is hoped that European manufacturers will soon have to come

LONDON

Sept.	Copper			Tin		Lead, Spanish	Zinc, Ordinaries
	Spot	3 Mos	Best Sel'td	Spot	3 Mos		
5	79⅛	79 11/16	84¼	217½	215½	21¾	26¾
6	79	79⅛	84	217¼	215¼	22⅛	26¾
7	....	....	....	.....	.....	....	....
9	78 11/16	79 11/16	84	219½	217	23¾	26¾
10	78¼	79¼	83¾	220⅛	217¾	23	26¾
11	78 5/16	79 1/16	83¾	222¼	219¼	23	27

The above table gives the closing quotations on London Metal Exchange. All prices are in pounds sterling per ton of 2240 lb. Copper quotations are for standard copper, spot and three months, and for best selected, price for the latter being subject to 3 per cent. discount. For convenience in comparison of London prices, in pounds sterling per 2240 lb., with American prices in cents per pound the following approximate ratios are given: £10 = 2.17½c.; £15 = 3.26c.; £25 = 5.44c.; £70 = 15.22c. Variations, £1 = 21¾c.

into the market, but the August statistics have not been received very favorably either abroad or at home. Some moderate sales of Lake copper have been made at 17⅝@17¾c. Electrolytic has been freely sold at 17.70c., delivered in Europe, corresponding to about 17.52½c., cash, New York, and some sales at 17.50c., cash, New York, have been made.

At the close Lake copper is quoted 17⅝@17¾c.; electrolytic copper in cakes, wirebars or ingots, 17.50@17.55c., while casting copper is quoted nominally at 17.30@17.40 as an average for the week.

The London Standard market has been dull and has fluctuated within narrow limits, with a tendency to ease off somewhat. On Sept. 5, spot was £79 2s. 6d., and three months £79 13s. 9d. On Sept. 9, spot was £78 18s. 9d., three months remaining £79 13s. 9d. On Sept. 10, both positions declined, spot to £78 10s., and three months to £79 5s., and the market closes at £78 6s. 3d. for spot, £79 1s. 3d. for three months.

Copper sheets are 23@24c. per lb., base for large lots. Full extras are charged and higher prices for small quantities. Copper wire is 19@19¼c. base, carload lots at mill.

Copper exports from New York for the week were 6112 long tons. Our special correspondent gives the exports from Baltimore at 2811 tons for the week.

Tin—The London market has been strong and advancing, due to heavy bull speculation. In this country, the market has lagged somewhat behind the import price, as the recent heavy arrivals had not yet been entirely absorbed. The statistical position of the metal is a strong one, and in many quarters it is expected that the market will go still higher. Over here tin for early delivery has sold at 47½@48½ at the close.

The London market, which on Sept. 5, closed at £217 10s. for spot, and £215 10s. for three months, advanced on Sept. 9, £2 for spot and £1 10s. for three months. On Sept. 10, the market was again higher, spot being quoted £220 10s., and three months £217 15s. On Sept. 11 it closed at £222 5s. for spot and £219 5s. for three months.

Lead—On Monday, Sept. 9, the principal producers raised their price to 5.10c. and the demand continues good at the higher level. At the close New York is quoted 5.10c. and St. Louis 5@5.02½ cents.

The foreign market is strong and advancing. Lead for early delivery is very scarce and there is no relief in sight. It seems that the consumption has overtaken production and there are no stocks. Spot lead sold as high as £23 15s. on Sept. 9 and closes strong at £23 for Spanish and 2s. 6d. higher for English lead.

The smelting plant of the Granby Mining & Smelting Co., at Granby, Mo., was destroyed by fire on Sept. 10.

Spelter—There has been a fair demand and business has been done at somewhat higher prices. Consumption is excellent, both in the galvanizing as well as in the brass trade. At the close St. Louis is quoted 7.25@7.30c.; New York 7.40@7.45 cents.

The London market is firm at £27 for good ordinaries and £27 5s. for specials.

Base price of zinc sheets is $8.75 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8% discount.

Zinc dust is quoted at 7⅛@7½c. per lb., New York.

Other Metals

Aluminum—Business has been good and the market is firm. Quotations are a little better, 24½@25c. per lb. being asked for No. 1 ingots, New York.

Antimony—The market is quieter than it has been, but there is still a fair business. Cookson's is quoted at 8.45@8.60c. per lb.; Hallett's 7.90@8c.; while 7.50@7.70c. is asked for Chinese, Hungarian and other outside brands.

Quicksilver—The market is steady, and prices here are unchanged. New York quotations are $42 per flask of 75 lb., with 60c. per lb. for retail lots. San Francisco, $41.50 for domestic orders and $39 for export. The London price has been reduced 5s. and is now £8 per flask, with £7 17s. 6d. quoted from second hands.

Spanish Metal Exports

Exports of metals and minerals from Spain, six months ended June 30, as reported by *Revista Minera*, in metric tons:

Metals	1911	1912	Changes	
Pig and manuf. iron	24,241	25,625	I.	1,384
Copper	7,680	11,958	I.	4,278
Copper precipitate	8,256	7,781	D.	475
Lead	84,739	92,175	I.	7,436
Zinc	641	1,331	I.	690
Quicksilver	1,233	1,472	I.	239
Minerals				
Iron ore	4,060,890	4,185,760	I.	124,870
Manganese ore	16,689	11,025	D.	5,664
Copper ore	189,611	77,838	D.	111,777
Lead ore	1,694	1,895	I.	201
Zinc ore	79,053	57,460	D.	21,593
Pyrites	1,258,762	1,459,053	I.	200,291
Salt	296,876	346,940	I.	50,064

Pyritic ores are now classed as pyrites unless they carry 2.5% or over in copper. Last year the dividing line was 1% copper.

Zinc and Lead Ore Markets

Joplin, Mo., Sept. 7—The high price of zinc-sulphide ore is $61, the base per ton of 60% zinc $54@58. Zinc-silicate sold at $29@31 per ton of 40% zinc. The average price, all grades of zinc, is $55.12. Lead ore sold on a base of $61 per ton, 80% metal, the high price reaching $62. The average, all grades, $59.16. Buyers this week introduced the purchase of lead ore on a dry weight. This has been pending some months. Buying on a base of 80% metal is more general again.

SHIPMENTS, WEEK ENDED SEPT. 7

	Blende	Calamine	Lead Ore	Value
Webb City-Carterville	5,095,810	.....	1,172,210	$180,395
Joplin	3,620,830	.....	301,290	114,040
Galena	961,940	.....	316,200	31,645
Miami	582,610	.....	211,740	21,285
Alba-Neck	577,480	.....	43,150	18,575
Duenweg	396,140	.....	172,700	16,500
Oronogo	624,720	.....	85,770	16,480
Carl Junction	409,350	.....	.....	12,280
Spurgeon	162,560	306,220	7,080	9,640
Cave Springs	316,000	.....	.....	8,850
Granby	58,380	297,280	24,200	7,710
Jackson	162,150	.....	2,700	5,615
Springfield	173,000	.....	.....	5,160
Carthage	178,700	.....	.....	4,990
Wentworth	176,980	.....	.....	4,780
Sarcoxie	130,010	.....	.....	3,640
Lawton	73,240	.....	.....	2,120
Aurora	52,460	.....	.....	1,470
Totals	13,752,360	603,500	2,337,040	$465,175
36 weeks	375,733,830	23,084,570	63,972,400	$11,958,635

Blende val., the week, $385,175; 36 weeks, $9,823,469
Calamine, the week, 10,560; 36 weeks, 352,652
Lead value, the week, 69,140; 36 weeks, 1,782,614

MONTHLY AVERAGE PRICES

Month	Zinc Ore				Lead Ore	
	Base Price		All Ores		All Ores	
	1911	1912	1911	1912	1911	1912
January	$41.85	$44.90	$40.55	$43.54	$55.68	$58.92
February	40.21	45.75	39.16	43.31	54.46	52.39
March	39.85	51.56	38.45	49.25	54.57	54.64
April	38.88	52.00	37.47	50.36	56.37	54.18
May	38.25	55.30	36.79	53.27	55.21	52.45
June	40.50	55.88	38.18	54.38	56.49	55.01
July	40.75	58.85	38.36	56.59	58.81	58.83
August	42.50	56.13	41.28	53.27	60.74	57.04
September	42.63	.....	41.29	.....	59.33	.....
October	42.38	.....	40.89	.....	54.72	.....
November	45.40	.....	43.25	.....	57.19	.....
December	44.13	.....	40.76	.....	62.03	.....
Year	$41.45	.....	$39.90	.....	$56.76	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore: the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

The stiff lift in spelter benefited producers, the average price being advanced $2.42½ per ton. The shipment was a large one, and yet it was reduced from lack of cars. Purchasers are getting out all the ore possible now, fearing a car blockade a little later. Some buyers have shifted a large portion of their buying from Wisconsin to the Joplin field.

Platteville, Wis., Sept. 7—The base price paid this week for 60% zinc ore was $55@56 per ton. No sales of lead ore reported.

SHIPMENTS, WEEK ENDED SEPT. 7

Camps	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Benton	1,074,800	.....	371,400
Mineral Point	735,260	.....	.....
Galena	460,700	.....	.....
Shullsburg	414,000	50,000	.....
Platteville	262,700	.....	66,000
Cuba City	220,360	.....	198,700
Hazel Green	200,000	.....	.....
Highland	189,700	.....	.....
Harker	132,230	.....	.....
Rewey	80,000	.....	.....
Montfort	68,000	.....	.....
Total	3,837,750	50,000	636,100
Year to date	141,080,150	3,937,420	24,107,530

Shipped during week to separating plants, 2,408,390 lb. zinc ore.

Other Ore Markets

Manganese Ore—The price for domestic ores as fixed by large buyers, is 25c. per unit for manganese and 5c. per unit for iron content, for a base ore containing 49% or over in manganese, not over 0.20 phosphorus and 8% silica. Prices range down to 23c. per unit for 40% manganese; with deductions for excess phosphorus and silica. Most of the manganese ore used here is imported—from India, Brazil and Russia—and is bought abroad on the open market.

There has been a still further advance in prices abroad. The current quotations in Great Britain are: Indian and Brazilian ore, 50% manganese, 22½@24c. per unit; 48%, 22@23c.; 45%, 21@21½. Russian ore, 50% manganese, 18@18½c.; 48%, 17½@18c. per unit.

Chemicals

New York, Sept. 11—The general markets continue fairly active and steady.

Arsenic—Supplies are still scarce and quotations are unchanged, $4.50@5 per 100 lb. being paid for white arsenic.

Copper Sulphate—Business is fair. Prices are unchanged at $5.50 per 100 lb. for carload lots, and $5.75 per 100 lb. for smaller parcels.

Nitrate of Soda—Business is improving and the market is strong. Prices are firm at 2.52½c. per lb. for spot nitrate and 2.55@2.57½c. for futures, according to date.

Petroleum

The monthly report of the *Oil City* Derrick gives new wells completed in August as follows: Pennsylvania, New York and West Virginia, 575; Lima-Indiana, 63; Kentucky, 18; Illinois, 126; Kansas-Oklahoma, 648; Texas-Louisiana, 134. In all the divisions there were 1564 wells completed, or 125 more than in July. The new production was 49,950 bbl., a decrease of 5047 bbl. from the July report. Among the completions there were 255 dry holes and 137 gas wells, an increase of 15 in the failures and of 30 in the number of gas wells. The productive oil wells numbered 1272, as against 1092 in July, 1148 in June and 981 in May. At the close of August there were 513 rigs and 1492 drilling wells. These figures show a decrease of one in the number of rigs and an increase of 18 in the drilling wells.

Mining Stocks

New York, Sept. 11—On Sept. 5 trading on the Exchange was still on a limited scale, but prices were stronger. On the Curb business was more active, the copper stocks making some gains, while other mining stocks were firm.

Sept. 6 trading on the Exchange was again light and the price movement without significance. The Curb was rather narrow on mining stocks. Coppers were quiet, with little change, and only a few of the Cobalts were in evidence. Trading in other stocks was confined to the low-priced issues.

Sept. 7 the Exchange was dull but firm. On the Curb business in mining stocks was light and prices irregular on small margins.

Sept. 9 the Exchange was unsettled and business light. Mining stocks on the Curb were in small demand. Braden Copper was the most prominent and gained a fraction.

Sept. 10 and 11 the Exchange continued dull and quiet, with very small changes in quotations. The Curb was also quiet and business in mining stocks was small and unimportant.

Boston, Sept. 10—Another favorable Copper Producers' statement failed to put any life into the stock market, although, to use the stereotyped phrase, the undertone is strong. Wolverine has been a particularly weak feature and broke $12 to $91, with some comeback from this level upon declaration of the regular $5 per share dividend. The decline was due to talk of the limited lease of life that the mine has.

Copper-share prices are off for the week in the main and money is short for stock-market purposes, call money being marked up to 6% today. Copper Range directors in declaring but a 50c. dividend gave some disappointment which was reflected temporarily in the price of the stock. Chino made a new high in this market. Butte & Superior has also been an active feature, advancing $5.75 during the week to $49.50, with subsequent setback to $47.75. Both Calumet & Hecla and North Butte are off from the recent high prices.

COPPER SMELTERS' REPORTS

This table is compiled from reports received from the respective companies, except in the few cases noted (by asterisk) as estimated, together with the reports of the U. S. Dept. of Commerce as to imported material, and in the main represents the crude copper content of blister copper, in pounds. In those cases where the copper contents of ore and matte are reported, the copper yield thereof is reckoned at 95%. In computing the total American supply duplications are excluded.

Company	June	July	August
Alaska shipments	4,134,569	2,224,441	1,242,836
Anaconda	22,750,000	23,000,000	25,250,000
Arizona, Ltd.	3,300,000	3,200,000	3,260,000
Copper Queen	7,622,730	7,708,147	8,040,424
Calumet & Ariz.	4,160 000	4,748,000	4,514,000
Chino	1,474,979	2,945,000	3,437,309
Detroit	1,959,634	2,194,090	1,882,289
East Butte	.....	.....	1,410,500
Mammoth	.....	.....	.....
Mason Valley	1,438,580	1,500,000	.....
Nevada Con	5,913,832	6,024,274	.....
Ohio	665,000	617,500	.....
Old Dominion	2,130,000	.....	2,620,000
Ray	3,004,195	2,985,965	2,888,095
Shannon	1,270,000	1,446,000	1,400,000
South Utah	162,335	142,555	224,855
United Verde*	2,500,000	.....	.....
Utah Copper Co.	8,772,742	10,602,000	.....
Lake Superior*	15,600,000	19,500,000	21,000,000
Non-rep. mines*	8,300,000	8,970,000	8,970,000
Total production	.....	.....	.....
Imports, bars, etc.	24,262,292	.....	.....
Total blister	.....	.....	.....
Imp. in ore & matte	8,404,936	.....	.....
Total American	.....	.....	.....
Miami†	2,683,310	3,027,710	3,048,750
Brit. Col. Cos.:			
British Col. Copper	996,000	1,026,000	.....
Granby	1,888,400	1,802,753	.....
Mexican Cos.:			
Boleo†	1,851 920	2,386,480	.....
Cananea	4,310,000	4,000,000	4,044,000
Moctezuma	3,176,819	3,094,016	3,229,899
Other Foreign:			
Cape Cop., S. Africa	.....	.....	.....
Kyshtim, Russia	.....	1,325,000	.....
Spassky, Russia	757,120	795,200	.....
Famatina, Argen.	.....	.....	.....
Tilt Cove, Newf'd.	.....	.....	.....
Exports from:			
Chile	9,856,000	8,960,000	.....
Australia	8,176,000	8,288,000	.....
Arrivals in Europe‡	12,667,200	14,114,240	.....

†Boleo copper does not come to American refiners. Miami copper goes to Cananea for treatment, and reappears in imports of blister.

‡Does not include the arrivals from the United States, Australia or Chile.

STATISTICS OF COPPER.

Month	U.S.Refin'y Product'n	Deliveries, Domestic	Deliveries for Export
VIII, 1911	125,493,667	59,935,364	69,855,660
IX	115,588,950	57,311,584	50,824,011
X	118,255,442	64,068,307	60,084,349
XI	111,876,601	68,039,776	67,049,279
XII	122,896,697	65,988,474	79,238,716
Year	1,431,938,338	709,611,605	754,902,233
I, 1912	119,337,753	62,343,901	80,167 904
II	116,035,809	56,228,368	63,148,096
III	125,694,601	67,487,466	58,779,566
IV	125,464,644	69,513,846	53.252,326
V	126,737,836	72,702,277	69,485,945
VI	122,315,240	66,146,229	61,449,650
VII	137,161,129	71,094,381	60,121,331
VIII	145,628,521	78,722,418	70,485,100

VISIBLE STOCKS

	United States	Europe	Total
IX, 1911	133,441,501	191,228,800	324,670,301
X	140,894,856	191,945,600	332,840,456
XI	134,997,642	176,825,600	311,823,242
XII	111,785,188	164,281,600	276,066,788
I, 1912	89.454,695	158,323,200	247,777,895
II	66,280,643	154,851,200	221,131,843
III	62,939,988	141,142,400	204,082,387
IV	62,367,557	136,819,200	199,186,757
V	65,066,029	134,176,000	199,242,029
VI	49,615,643	117,801,600	167,417,243
VII	44,335,004	108,186,000	152,521,004
VIII	50,280,421	113.299.200	163,579,621
IX	46,701,374	113,568,000	160.269,374

Alaska Gold Mines stock has been the Curb feature, selling up to $9.12½ on very heavy trading. This is $5 paid in, and deliveries of the stock will begin tomorrow. Corbin Copper is off to 90c. Bingham Mines is up to $5.37½ on a good volume of trading.

Assessments

Company	Delinq	Sale	Amt
Andes, Nev.	Sept. 26	Oct. 17	$0.05
Black Bear, Ida.	Sept. 26	Oct. 26	0.01
Black Pine M. & M., Utah.	Aug. 29	Sept. 19	0.00½
Cedar Talisman, Utah.	Sept. 14	Oct. 3	0.00½
Con. Virginia, Nev.	Aug. 11	Sept. 5	0.20
Dalmatia, Ida.	Aug. 24	Sept. 21	0.002
Empire, Ida.	Sept. 23	Oct. 23	0.002
Great Eastern, Ida.	Sept. 28	Oct. 28	0.002½
Hilarity, Ida.	Sept. 5	Oct. 5	0.002
JohnnyGold M.&M.Co.,Utah	Aug. 30	Sept. 20	0.00½
Laclede, Ida.	Aug. 1	Aug. 24	0.003
Little Butte, Ida.	Sept. 21	Oct. 21	0.001
Mineral Hill, Nev.	Aug. 5	Oct. 5	0.01
New Hope, Ida	Sept. 3	Oct. 3	0.002
Now Reliance, S. Dak.	.....	.....	0.01
Ohio Copper, Utah.	Aug. 28	.....	0.50
Reindeer, Ida.	Sept. 7	Oct. 5	0.003
Savage, Nev.	Oct. 2	Oct. 24	0.10
Sierra-Nevada, Nev.	Sept. 25	Oct. 16	0.05
Smuggler, Utah.	Aug. 20	Sept. 20	0.00½
Twin Star, Ida.	Aug. 31	Sept. 28	0.02
Wasatch, Utah.	Sept. 27	Oct. 16	0.01

Monthly Average Prices of Metals

SILVER

Month	New York			London		
	1910	1911	1912	1910	1911	1912
January	52.375	53.795	56.260	24.154	24.865	25.887
February	51.534	52.222	59.043	23.794	24.081	27.190
March	51.454	52.745	58.375	23.690	24.324	26.875
April	53.221	53.325	59.207	24.483	24.595	27.284
May	53.870	53.308	60.880	24.797	24.583	28.038
June	53.462	53.043	61.290	24.651	24.486	28.215
July	54.150	52.630	60.654	25.034	24.286	27.919
August	52.912	52.171	61.606	24.428	24.082	28.375
September	53.295	52.440	.....	24.567	24.209	.....
October	55.490	53.340	.....	25.596	24.594	.....
November	55.635	55.719	.....	25.680	25.649	.....
December	54.428	54.905	.....	25.160	25.349	.....
Year	53.486	53.304	.....	24.670	24.592	.....

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

COPPER

Month	New York				London, Standard	
	Electrolytic		Lake			
	1911	1912	1911	1912	1911	1912
January	12.295	14.094	12.680	14.337	55.600	62.760
February	12.256	14.084	12.611	14.329	54.974	62.893
March	12.139	14.698	12.447	14.868	54.704	65.884
April	12.019	15.741	12.275	15.930	54.034	70.294
May	11.989	16.031	12.214	16.245	54.313	72.352
June	12.385	17.234	12.611	17.443	56.365	78.259
July	12.463	17.190	12.720	17.353	56.673	76.636
August	12.405	17.498	12.634	17.644	56.266	78.670
September	12.201	.....	12.508	.....	55.253	.....
October	12.189	.....	12.370	.....	55.170	.....
November	12.616	.....	12.769	.....	57.253	.....
December	13.552	.....	13.768	.....	62.068	.....
Year	12.376	.....	12.634	.....	55.973	.....

New York, cents per pound, London, pounds sterling per long ton of standard copper.

TIN AT NEW YORK

Month	1911	1912	Month	1911	1912
January	41.255	42 529	July	42 400	44 519
February	41 614	42.962	August	43 319	45 857
March	40.157	42.577	September	39 755	.....
April	42 185	43.923	October	41.185	.....
May	43.115	46.053	November	43.125	.....
June	44.606	45 815	December	44.655	.....
			Av. Year	42.281	.....

Prices are in cents per pound.

LEAD

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	4.483	4.435	4.334	4.327	13.009	15.619
February	4.440	4.026	4.266	3.946	13.043	15.738
March	4.394	4.073	4.238	4.046	13.122	15.997
April	4.412	4.200	4.262	4.118	12.889	16.331
May	4.373	4.194	4.223	4.072	12.984	16.509
June	4.435	4.392	4.292	4.321	13.260	17.588
July	4.499	4.720	4.397	4.603	13.530	18.544
August	4.500	4.569	4.406	4.452	14.260	19.679
September	4.485	.....	4.356	.....	14.744	.....
October	4.265	.....	4.139	.....	15.332	.....
November	4.298	.....	4.181	.....	15.821	.....
December	4.450	.....	4.332	.....	15.648	.....
Year	4.420	.....	4 286	.....	13.970	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month	New York		St. Louis		London	
	1911	1912	1911	1912	1911	1912
January	5.452	6.442	5.302	6.292	23.887	26.642
February	5.518	6.499	5.368	6.349	23.276	26.661
March	5.563	6.626	5.413	6.476	23.016	26.048
April	5.399	6.633	5.249	6.483	23.743	25.644
May	5.348	6.679	5.198	6.529	24.375	25.790
June	5.520	6.877	5.370	6.727	24.612	25.763
July	5.695	7.116	5.545	6.966	25.006	26.174
August	5.953	7.028	5.803	6.878	26.801	26.443
September	5.869	.....	5.719	.....	27.750	.....
October	6.102	.....	5.951	.....	27.256	.....
November	6.380	.....	6.223	.....	26.795	.....
December	6.301	.....	6.151	.....	26.849	.....
Year	5.758	.....	5.608	.....	25.281	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PIG IRON AT PITTSBURG

Month	Bessemer		Basic		No. 2 Foundry	
	1911	1912	1911	1912	1911	1912
January	$15.90	$15.12	$14.40	$13.32	$14.75	$14.00
February	15.90	15.03	14.50	13.28	14.81	14.01
March	15.90	14.95	14.65	13.66	14.96	14.10
April	15.90	15.13	14.65	13.90	15.00	14.15
May	15.90	15.14	14.30	13.90	14.72	14.12
June	15.90	15.15	14.06	14.11	14.56	14.22
July	15.90	15.15	14.03	14.38	14.53	14.38
August	15.90	15.43	14.00	14.90	14.47	14.85
September	15.90	.....	13.57	.....	14.40	.....
October	15.43	.....	13.44	.....	14.34	.....
November	14.92	.....	13.30	.....	14.25	.....
December	15.15	.....	13.10	.....	13.90	.....
Year	$15.72	.....	$13.94	.....	$14.49	.....

STOCK QUOTATIONS

COLO. SPRINGS Sept. 10

Name of Comp.	Bid.
Acacia	.04¾
Cripple Cr'k Con.	.01¾
C. K. & N.	.17
Doctor Jack Pot.	.06
Elkton Con.	.65½
El Paso	1.08½
Findlay	.06¾
Gold Dollar	.17½
Gold Sovereign	.02½
Isabella	.19½
Jack Pot	.05
Jennie Sample	.06¾
Lexington	‡.009
Moon Anchor	‡.009
Old Gold	.03¾
Mary McKinney	.70
Pharmacist	.01½
Portland	.96
Vindicator	.80½
Work	.01

SALT LAKE Sept. 10

Name of Comp.	Bid.
Beck Tunnel	.09¼
Black Jack	.12
Cedar Talisman	.00¾
Colorado Mining	.17
Columbus Con.	.15
Crown Point	.02½
Daly-Judge	‡5.75
Grand Central	.62
Iron Blossom	1.20
Little Bell	‡.30
Lower Mammoth	.06¾
Mason Valley	‡12.00
May Day	.14½
Nevada Hills	1.90
New York	‡.03
Prince Con	1.70
Silver King Coal'n	2.75
Sioux Con.	.04½
Uncle Sam	.14
Yankee	‡.11

TORONTO Sept. 10

Name of Comp.	Bid	Name of Comp.	Bid
Coniagas	7.40	Hollinger	12.15
Hudson Bay	‡65.00	Imperial	.01
Temiskaming	.38	Pearl Lake	.10
Wettlaufer-Lor.	.41	Porcu. Gold	.20
Apex	.02	Porcu. Tisdale	.01
Central	‡5.56	Preston E. D.	.02
Crown Chartered	.06	Rea	.25
Dobie	.20	Standard	‡.00½
Dome Exten.	.09	Swastika	.07
Foley O'Brien	.12	West Dome	.05

SAN FRANCISCO Sept. 10

Name of Comp.	Clg.
COMSTOCK STOCKS	
Alta	.07
Belcher	‡.40
Best & Belcher	.04
Caledonia	.97
Challenge Con.	.10
Choliar	.06
Confidence	.50
Con. Virginia	.44
Crown Point	.28
Gould & Curry	.02
Hale & Norcross	.06
Mexican	2.75
Occidental	.50
Ophir	.60
Overman	.43
Potosi	.02
Savage	.04
Sierra Nevada	.11
Union Con.	‡.73
Yellow Jacket	.32

Name of Comp.	Bid
MISC. NEV. & CAL.	
Belmont	9.90
Jim Butler	.67
MacNamara	.23
Midway	.59
Mont.-Tonopah	2.17½
North Star	.25
West End Con.	1.57½
Atlanta	.24
Booth	.05
C.O.D. Con.	.10
Comb. Frac.	.16
Jumbo Extension	.40
Pitts.-Silver Peak	.98
Silver Pick	.10
St. Ives	.30
Tramp Con.	‡.04
Argonaut	‡2.50
Bunker Hill	‡4.50
Central Eureka	.38
So. Eureka	‡2.90

N. Y. EXCH. Sept. 3

Name of Comp.	Clg.
Amalgamated	87⅛
Am. Agri. Chem.	58¾
Am.Sm.&Ref.,com	85⅝
Am. Sm. & Ref., pf.	108
Am. Sm. Sec., pf. B	87⅛
Anaconda	46
Batopilas Min.	1¼
BethlehemSteelpf	72½
Chino	42½
Comstock Tunnel	‡.10½
Federal M. & S., pf.	45
Goldfield Con.	3⅜
GreatNor.,ore,,ctf.	46
Guggen. Exp.	59
Homestake	96
Inspiration Con.	18⅝
Miami Copper	29¼
Nat'nalLead,com.	60¾
National Lead, pf.	107
Nev. Consol.	22¾
Pittsburg Coal, pf.	96½
Ray Con.	21⅞
RepublicI&S,com.	27⅝
Republic I & S, pf.	89
SlossSheffi'd,com.	55
Sloss Sheffield, pf.	‡100
Tennessee Copper	44
Utah Copper	65¾
U. S. Steel, com.	72¾
U. S. Steel, pf.	113
Va. Car. Chem.	45

N. Y. CURB Sept. 10

Name of Comp.	Clg.
Barnes King	.88
Beaver Con.	.45
Braden Copper	7
B. C. Copper	6⅛
Buffalo Mines	1⅜
Caledonia	.40
Con. Ariz. Sm.	⅛
Davis-Daly	2⅛
Diam'field-Daisy	8
Ely Con.	.30
Florence	.90
Giroux	5⅛
Gold Hill Con.	⅛
Greene Cananea	.10
Greenwater	.06
Internat. S. & R.	‡124
Kerr Lake	2⅛
Keystone	2⅜
La Rose	2⅛
McKinley-Dar-Sa.	2
Min. Co. of A. new	3¼
Motherlode Gold.	⅛
Nev. Utah M. & S.	‡.01
Nipissing Mines	8¾
Ohio Copper	⅛
Pacific Sm. & M.	⅛
South Live Oak	1⅜
South Utah M. & S.	⅛
Standard Oil (Old)	1110
Stand'd Oil of N.J.	411
Stand'd Oil Subs.	685
Stewart	1⅛
Tonopah	7⅜
Tonopah Ex.	2¾
Tri-Bullion	⅛
Tularosa	1
Union Mines	‡.⅛
United Cop., pfd.	10
Yukon Gold	3⅝

LONDON Sept. 11

Name of Com	Clg.
Camp Bird	£1 8s 6d
Dolores	1 10 0
El Oro	0 14 0
Esperanza	1 13 6
Mexico Mines	7 12 6
Oroville	0 5 3
Stratton'sInd.	0 3 1½
Tomboy	1 6 3

BOSTON EXCH. Sept. 10

Name of Comp.	Clg.
Adventure	8
Ahmeek	‡350
Algomah	5
Allouez	46
Am. Zinc	31⅛
Ariz. Com., ctfs.	4¾
Bonanza	‡.40
Boston & Corbin	‡7¾
Butte & Balak	‡3¾
Calumet & Ariz	80¼
Calumet & Hecla	555
Centennial	‡22⅞
Con. Mercur	‡.03
Copper Range	58¾
Daly West	‡4¾
East Butte	13¾
Franklin	11
Granby	56¾
Hancock	27½
Hedley Gold	‡19⅞
Helvetia	‡1
Indiana	18¼
Island Cr'k, com.	‡55
Island Cr'k, pfd.	88½
Isle Royale	35½
Keweenaw	1
Lake	36¼
La Salle	‡6¾
Mass	7⅛
Michigan	‡2½
Mohawk	67
New Arcadian	‡3¾
New Idria Quick	‡6⅞
North Butte	34
North Lake	5¼
Ojibway	4¾
Old Dominion	61
Osceola	114
Quincy	‡92½
Shannon	16
Shattuck-Ariz.	‡21½
Superior	46¾
Superior & Bost.	‡1⅞
Tamarack	42
Trinity	6
Tuolumne	2¾
U. S. Smelting	46¼
U. S. Smelt'g, pf.	50¾
Utah Apex	‡2¼
Utah Con	12
Victoria	‡3
Winona	5⅛
Wolverine	93
Wyandot	2

BOSTON CURB Sept. 10

Name of Comp.	Last
Bingham Mines	5½
Boston Ely	1
Boswyocolo	02
Butte Central	7
Cactus	10
Calaveras	2⅛
Chief Cons	1⅛
Corbin	.92
Cortez	.95
Crown Reserve	3⅛
First Nat. Cop.	2
Majestic	.47
Mazatan	‡⅛
Moneta Porc.	‡.05
Nevada-Douglas	3½
New Baltic	2⅛
Oneco	1⅛
Raven Copper	.28
Rhode Island Coal	18
San Antonio	‡3
S. W. Miami	5
South Lake	8½
Trethewey	.40
United Verde Ext.	.49
Vulture	‡5

‡Last quotation.

Mining Companies—United States

Name of Company and Situation		Shares Issued	Shares Par Val	Dividends Total to Date	Dividends Latest Date	Dividends Latest Amt
Acacia, g	Colo	1,438,989	$ 1	$ 129,618	Jan. '11	$0.01
Adams, s.l.c	Colo	80,000	10	778,000	Dec. '09	0.04
Ahmeek, c	Mich	50,000	25	700,000	July '12	5.00
Alaska Mexican, g	Alas	180,000	5	3,039,381	Aug. '12	0.35
Alaska Treadwell, g	Alas	200,000	25	12,510,000	Aug. '12	0.75
Alaska United, g	Alas	180,200	5	1,072,190	Aug. '12	0.50
Am. Zinc, Lead & Sm	U. S.	163,280	25	711,820	July '12	0.50
Anaconda, c	Mont	4,332,500	25	65,171,250	July '12	0.50
Argonaut, g	Cal	200,000	5	1,200,000	June '10	0.05
Arizona Copper, pf	Ariz	1,426,120	1.20	2,003,391	May '12	0.047
Arizona Copper, com	Ariz	1,519,896	1.20	14,230,128	Feb. '12	0.30
Bagdad-Chase, g., pf	Cal	84,819	5	202,394	Jan. '09	0.10
Baltic, c	Mich	100,000	25	7,050,000	June '11	5.00
Bingham N. H., c	Utah	228,690	5	294,219	July '12	0.10
Bonanza Dev., g	Colo	300,000	1	1,425,000	Oct. '11	0.20
Bunker Hill Con., g	Cal	200,000	1	646,000	Aug. '12	0.07½
Bunker Hill & Sul., l.s	Ida	327,000	10	13,715,550	Sept. '12	0.20
Butte & Ballaklava, c	Mont	250,000	10	125,000	Aug. '10	0.50
Caledonia, l.s.c	Ida	1,300,000	1	52,000	June '10	0.01
Calumet & Arizona, c	Ariz	596,353	10	14,881,765	June '12	1.00
Calumet & Hecla, c	Mich	100,000	25	117,650,000	June '12	10.00
Camp Bird, g.s	Colo	1,100,000	5	7,848,900	Feb. '12	0.48
Centen'l-Eur., l.s.g.c	Utah	100,000	5	3,450,000	Apr. '12	1.50
Center Creek, l.z	Mo	100,000	10	440,000	July '12	0.05
Champion, c	Mich	100,000	25	7,100,000	July '12	1.00
Cliff, g	Utah	300,000	1	90,000	Feb. '12	0.10
Cliff, g	Alas	100,000	1	140,000	May '11	0.25
Colo. Gold Dredging	Colo	100,000	10	150,000	Aug. '12	0.25
Colorado, l.s.g	Utah	1,000,000	0.20	2,570,000	June '12	0.03
Columbus Con., g.s	Utah	285,540	5	226,832	Oct. '07	0.20
Commercial Gold	Ore	1,750,000	1	43,750	Dec. '10	0.00½
Con. Mercur., g	Utah	1,000,000	1	3,415,313	July '12	0.03
Continental, z. l	Mo	'22,000	25	275,000	July '12	0.50
Copper Range Con., c	Mich	393,445	100	12,709,988	July '12	0.50
Daly Judge, s.l	Utah	300,000	1	360,000	July '12	0.15
Daly West, s.l	Utah	180,000	20	6,538,000	July '12	0.30
Doctor Jackpot, g	Colo	3,000,000	0.10	90,000	Mar. '11	0.00½
Doe Run, l	Mo	65,782	100	3,040,523	June '12	1.50
Elkton Con., g	Colo	2,500,000	1	2,991,960	May '12	0.01
El Paso, g	Colo	2,450,000	1	1,548,295	June '12	0.01
Fed. M. & S., com	Idaho	60,000	100	2,708,750	Jan. '09	1.50
Fed. M. & S., pf	Idaho	120,000	100	7,211,250	June '12	1.50
Florence, g	Nev	1,050,000	1	840,000	Apr. '11	0.10
Frances-Mohawk, g	Nev	912,000	1	546,000	Jan. '08	0.05
Free Coinage, g	Colo	10,000	100	180,000	Dec. '09	1.00
Fremont Con., g	Calif	200,000	2.50	154,000	Aug. '12	0.02
Frontier, z	Wis	1,250	100	141,272	Sept. '12	2.00
Gemini-Key'ne, l.g.s	Utah	5,000	100	2,130,000	Oct. '11	6.00
Gold Chain, g	Utah	1,000,000	1	20,000	July '12	0.02
Gold Coin of Victor	Colo	1,000,000	1	1,350,000	Feb. '09	0.02
Gold Dollar Con	Colo	2,500,000	0.10	75,000	June '12	...
Gold King Con., g	Colo	5,750,370	1	1,407,319	Dec. '11	0.03
Golden Cycle, g	Colo	1,500,000	5	2,100,000	Sept. '12	0.02
Golden Star, g	Ariz	400,000	5	140,000	Mar. '10	0.05
Goldfield Con., g	Nev	3,558,367	10	22,771,322	July '12	0.30
Grand Central, g	Utah	500,000	1	1,445,750	Aug. '12	0.05
Granite, g	Colo	1,650,000	1	253,000	Dec. '10	0.01
Hazel, g	Cal	900,000	1	864,000	July '12	0.01
Hecla, l.s	Idaho	1,000,000	0.25	2,510,000	Aug. '12	0.02
Hercules, l.s	Idaho	1,000,000	1	3,650,000	July '11	0.06
Homestake, g	S. D	218,400	100	28,522,040	Sept. '12	0.50
Iowa, g.s.l	Colo	1,666,667	1	200,166	June '11	0.00½
Iowa-Tiger Leasing g.s	Colo	12,655	1	13,921	Jan. '12	0.10
Iron Blossom, s.l.g	Utah	1,000,000	0.10	1,270,000	July '12	0.10
Iron Silver, s.l.g	Colo	500,000	20	4,500,000	Jan. '12	0.10
Jamison, g	Cal	390,000	10	378,300	Jan. '11	0.02
Jerry Johnson, g	Colo	2,500,000	0.10	150,000	Aug. '11	0.01
Kendall, g	Mont	500,000	5	1,375,000	Jan. '12	0.02
Kennedy, g	Cal	100,000	100	1,831,001	Apr. '10	0.03
King of Arizona, g	Ariz	200,000	1	396,000	Aug. '09	0.12
Knob Hill, g	Wash	1,000,000	1	45,000	May '12	0.00½
Liberty Bell, g	Colo	130,551	5	522,093	Oct. '10	1.00
Little Bell, l.s	Utah	300,000	1	75,000	Mar. '11	0.05
Little Florence, g	Nev	1,000,000	1	430,000	Jan. '08	0.03
Mammoth, g.s.c	Utah	400,000	25	2,220,000	Mar. '08	0.05
Mary McKinney, g	Colo	1,309,252	1	959,826	July '12	0.02
May Day, g.s.l	Utah	800,000	0.25	108,000	Sept. '08	0.01½
Mexican, g.s	Nev	201,600	2.50	20,160	Aug. '11	0.10
Miami, c	Ariz	664,993	5	664,993	Aug. '12	0.50
Modoc, g.s	Colo	500,000	1	275,000	Dec. '11	0.01
Mohawk M. Co	Mich	100,000	25	2,675,000	Aug. '12	2.50
Monarch-Mad'a, g.s.l	Colo	1,000,000	1	40,000	May '11	0.01
Montana-Tonop., s.g	Nev	921,865	1	430,000	June '12	0.10
Mountain, c	Cal	250,000	25	4,216,250	May '08	0.44
National, g	Nev	750,000	1	570,000	May '11	0.10
Nevada Con., c	Nev	1,999,394	5	8,228,086	June '12	0.37½
New Century, z.l	Mo	330,000	1	237,600	Oct. '09	0.01
New Idria, q	Cal	100,000	5	1,600,000	July '12	0.30
North Butte, c	Mont	410,000	15	10,248,000	July '12	0.50
North Star, g	Cal	250,000	10	3,624,489	July '12	0.15
Old Domin'n, M. & Sm	Ariz	162,000	25	2,351,000	July '12	1.25
Ophir, s. g	Nev	201,600	3	2,068,360	Jan. '12	0.10
Opohongo, g.s.l	Utah	898,978	0.25	44,948	July '12	0.02
Oroville Dredging	Cal	700,000	5	1,383,036	Dec. '09	0.12½
Osceola, c	Mich	96,150	25	10,593,200	July '12	6.00
Parrot, c	Mont	229,850	10	7,114,942	Aug. '12	0.15
Pearl Con., g	Wash	1,909,711	0.05	181,422	Dec. '10	0.02
Pharmacist, g	Colo	1,500,000	1	87,500	Feb. '10	0.00½
Pioneer, g	Alas	5,000,000	1	4,041,526	Oct. '11	0.03
Pittsburgh-Idaho, l	Ida	803,000	1	184,690	Aug. '12	0.04
Pittsburgh Silver Peak, g	Nev	2,900,000	1	288,000	July '12	0.16
Portland, g	Colo	3,000,000	1	9,097,080	July '12	0.02
Quilp	Wash	1,500,000	1	67,500	Feb. '12	0.01
Quincy, c	Mich	110,000	25	20,177,500	June '12	1.25
Republic, g	Wash	1,000,000	1	85,000	Dec. '10	0.01½
Rochester, l.s	Mo	4,900	100	188,396	Dec. '10	0.50
Round Mountain, g	Nev	866,426	1	328,404	Sept. '10	0.04
Seven Troughs Coal. g	Utah	1,500,000	1	37,500	July '12	0.02½
St. Joseph, l	Mo	1,000,000	10	8,258,357	June '12	0.15
Shannon, c	Ariz	300,000	10	450,000	July '07	0.50
Shattuck-Arizona, c	Ariz	350,000	10	1,050,000	Jan. '11	1.00
Silver King Coal. l.s	Utah	1,250,000	5	1,659,885	Jan. '10	$0.15
Sioux Con., s.l.g	Utah	745,389	$ 1	872,097	July '11	0.04
Skidoo, g	Cal	1,000,000	5	275,000	May '12	0.02½
Smuggler, l.s.z	Colo	1,000,000	1	$ 2,235,000	Nov. '06	0.03
Snowstorm, c.g	Ida	1,500,000	1	1,005,000	Aug. '10	0.01
South Eureka, g	Calif	299,981	1	366,881	Apr. '12	0.07
Standard Con., g.s	Cal	178,394	10	5,229,809	Jan. '12	0.10
Stratton's Ind., g	Colo	1,000,000	0.60	364,500	Apr. '12	0.06
Success, z	Ida	1,500,000	1	730,000	May '12	0.02
Superior & Pitts., c	Ariz	1,499,793	10	3,089,574	Aug. '12	0.30
Tamarack, c	Mich	60,000	25	9,420,000	July '07	4.00
Tennessee, c	Tenn	200,000	25	3,106,520	Aug. '12	1.00
Tomboy, g. s	Colo	300,000	4.85	2,843,100	Dec. '11	0.24
Tom Reed, g	Ariz	909,555	1	736,824	Aug. '12	0.05
Tonopah Belm't, s.g	Nev	1,500,000	1	3,218,003	July '12	0.25
Tonopah Ext., g.s	Nev	943,433	1	306,615	July '12	0.02½
Tonopah of Nev., s.g	Nev	1,000,000	1	9,250,000	July '12	0.40
Tri-Mountain, c	Mich	100,000	25	950,000	Dec. '10	1.00
Tuolumne, c	Mont	800,000	1	360,000	Aug. '11	0.15
Uncle Sam, g. s. l	Utah	500,000	1	495,000	Sept. '11	0.05
United (Crip. Ck.) g	Colo	4,000,100	1	440,435	Jan. '10	0.04
United Globe, c	Ariz	23,000	10	667,000	July '12	4.50
United Verde, c	Ariz	300,000	10	30,322,000	June '12	0.75
Utah, s.l	Utah	100,000	10	325,000	Dec. '10	0.02
Utah, c	Utah	1,562,599	10	13,876,106	June '12	0.75
Utah Con., c	Utah	300,000	5	7,200,000	May '12	0.50
Valley View, g	Colo	1,000,000	1	240,000	Dec. '10	0.04
Victoria, g.s.l	Utah	250,000	1	207,500	Mar. '10	0.04
Vindicator Con., g	Colo	1,500,000	1	2,497,500	Apr. '12	0.03
Wasp No. 2, g	S. D	500,000	1	341,966	Aug. '12	0.02
Wellington Mines, g	Colo	10,000,000	1	200,000	July '12	0.00½
Wolverine, c	Mich	60,000	25	7,140,000	Apr. '12	5.00
Work, g	Colo	1,500,000	1	172,500	July '08	0.00½
Yak, s.l	Colo	1,000,000	1	1,417,685	Oct. '10	0.04
Yankee Con., g.s	Utah	1,000,000	1	182,500	July '07	0.01½
Yellow Aster, g	Cal	100,000	10	1,081,789	Jan. '12	0.05
Yellow Pine, g	Nev	950,000	1	47,500	Aug. '12	0.02
Yukon Gold, g	Alas	3,500,000	5	3,947,500	June '12	0.07½

Coal, Iron, Industrial and Holding Companies

Amalgamated, c	Mont	1,538,879	$100	$69,734,840	Aug. '12	$1.00
Am. Sm. & Ref., com	U. S.	500,000	100	22,708,333	June '12	0.66⅔
Am. Sm. & Ref., pf	U. S.	500,000	100	40,833,333	June '12	1.16⅔
Am. Smelters, pf. A	U. S.	170,000	100	6,855,000	July '12	1.50
Am. Smelters, pf. B	U. S.	300,000	100	10,232,000	July '12	1.25
Cambria Steel	Penn	900,000	50	15,647,500	Aug. '12	0.62½
Central C. & C., com	Mo	51,250	100	3,539,375	July '12	1.50
Central C. & C., pf	Mo	18,750	100	1,714,370	July '12	1.25
Consolidation Coal	Md	190,247	100	20,533,894	July '12	1.50
Greene Cananea	U. S.	2,471,314	25	1,237,656	Aug. '12	0.25
Guggenheim, Expl.	U. S.	207,933	100	14,170,153	July '12	2.50
Inter'l Nickel, com	U. S.	115,826	100	5,659,471	June '12	7.00
Inter'l Nickel, pfd	U. S.	89,126	100	3,609,500	Aug. '12	1.50
Inter'l Sm & Ref	U. S.	100,000	100	2,500,000	Aug. '12	2.00
Lehigh Coal & Nav	Penn	482,956	50	22,052,156	Aug. '12	1.00
National Lead, com	N. Y	206,554	100	6,866,736	June '12	0.75
National Lead, pf	N. Y	243,676	100	25,003,332	June '12	1.75
Old Dominion, c	Ariz	293,245	25	2,846,735	July '12	1.00
Phelps, Dodge & Co	U. S.	450,000	100	19,334,304	June '12	4.50
Pittsburgh Coal, pf	Penn	297,010	100	15,137,583	July '12	1.25
U. S. Steel Corp., com	U. S.	5,083,025	100	162,634,945	June '12	1.25
U. S. Steel Corp., pf	U. S.	3,602,811	100	313,549,063	Aug. '12	1.75
U. S. S., R. & M., com	U.S.-Mex.	486,320	50	4,255,538	July '12	0.50
U. S. Sm., R. & M., pf	U.S.-Mec.	351,105	50	10,837,575	July '12	0.87½

Canadian, Mexican and Central American Companies

Ajuchitlan, g.s	Mex	50,000	$ 5	$ 185,000	Apr. '12	$0.25
Amparo, g.s	Mex	2,000,000	1	860,000	Aug. '12	0.03
B. C. Copper	B. C	591,709	5	437,886	July '12	0.15
Beaver Con., s	Ont	1,996,490	1	289,901	July '12	0.03
Buffalo, s	Ont	1,000,000	1	1,480,000	Aug. '12	0.05
Cobalt Townsite, s	Ont	1,000,000	1	150,000	May '12	0.05
Coniagas, s	Ont	800,000	5	3,800,000	Aug. '12	0.30
Crown Reserve, s	Ont	1,768,814	1	4,245,153	Aug. '12	0.05
Crow's Nest Pass C. Co	B. C	248,506	25	2,182,864	Mar. '11	0.25
Dominion Coal, com	N. S	150,000	100	5,400,000	July '12	1.00
Dominion Coal, pf	N. S	50,000	100	4,915,000	Aug. '12	3.50
Dos Estrellas, g.s	Mex	300,000	0.50	6,780,000	Jan. '11	2.50
El Oro, g.s	Mex	1,147,500	4.85	8,295,564	Dec. '11	0.36
Esperanza, s.g	Mex	455,000	4.85	10,835,127	June '12	0.36
Granby, s.l.c	B. C	148,496	100	4,197,111	Dec. '10	1.00
Greene Con., c	Mex	1,000,000	10	6,794,400	Mar. '12	0.30
Guanajuato D., pf., s	Mex	10,000	1000	274,356	Jan. '11	3.00
Hedley Gold	B. C	120,000	10	624,000	June '12	0.50
Kerr Lake s	Ont	600,000	5	4,020,000	June '12	0.25
La Rose Con., s	Ont	1,498,407	5	2,951,851	July '12	0.12½
Le Roi No. 2, g	B. C	120,000	24.38	1,428,840	July '12	0.24
Lucky Tiger Com., g	Mex	715,337	10	1,446,435	Aug. '12	0.05
McK.-Dar. Sav. s	Ont	2,247,692	1	2,607,320	July '12	0.10
Mines Co. of Am. (new)	Mex	1,700,000	10	*877,500	Jan. '12	0.15
N. Y. & Hond. Ros	C. A	150,000	10	3,082,500	Mar. '12	0.15
Nipissing, s	Ont	1,200,000	5	8,640,000	July '12	0.37½
Peñoles, s.l.g	Mex	80,000	25	5,760,688	June '12	1.25
Peregrina M. & M., pf	Mex	10,000	100	328,656	Sept. '10	3.50
Pinguico, pf., s	Mex	20,000	100	600,000	Oct. '11	3.00
Right of Way Mns†	Ont	1,685,500	1	202,260	Dec. '11	0.02
Rio Plata, s	Mex	373,437	5	354,990	Mar. '12	0.10
San Rafael, g.s	Mex	2,400	25	1,437,624	Jan. '12	2.00
San Toy, g.s	Mex	6,000,000	1	360,000	Dec. '11	0.10
Sopresa, g.s	Mex	19,200	20	1,517,438	Jan. '11	34.00
Stand'd Silver-Lead	B. C	2,000,000	1	225,000	Aug. '12	0.02½
Temiskaming, s	Ont	2,500,000	1	1,159,155	July '12	0.03
Tem. & Hud. Bay, s	Ont	7,761	1	1,659,854	Aug. '12	3.00
Trethewey, s	Ont	1,000,000	1	861,998	July '12	0.10
Wettlaufer-Lorrain, s	Ont	1,416,590	1	424,977	July '12	0.05

*Previous to reorganization, $5,258,881.
†Previous to January, 1910, $324,644.

INDUSTRIALS

The Canadian Copper Co., Copperclíffe, Ontario, have ordered a Ruggles-Coles Class F-8 dryer.

The American Smelting & Refining Co., Omaha, Neb., have purchased a Ruggles-Coles F-7 dryer for treating ore.

The Nichols Copper Co., Laurel Hill, L. I., have placed the order for a Terry turbine driven 350 g.p.m. boiler feed pump and a 1200 g.p.m. double suction pump.

The Dodge Mfg. Co., Mishawaka, Ind., has just received an order from the American Boston Mining Company, Clowry, Mich., for twelve lineshafts equipped with chain oiling ball and socket pillow blocks.

The Tarred Granites Co., Ltd., London, have purchased from the Ruggles-Coles Engineering Co., 50 Church St., New York City, a class A-2 dryer for treating crushed granite, the capacity of the dryer being 8 tons per hour.

The Mill & Smelter Engineering Co. of 114 Liberty St., New York, advise a great improvement in their business, having lately shipped to Guatemala a complete silver lead smelting plant sectionalized, and a 20 stamp amalgamating plant with steam power to Venezuela.

The Braden Copper Company of South America has just placed an order for four 8-foot diameter Hardinge pebble mills, all steel trunnions with cut gears for concentration grinding. These mills are similar in type to those furnished to the Miami and other Copper Companies of Arizona.

The Keystone Driller Co., Monadnock Block, Chicago, announce the establishment of a Southern branch office at 1629 Candler Bldg., Atlanta, Ga. The office is in charge of Mr. McCarthy, who will look after the sale of Keystone well drilling machinery and Downie deep well pumps in the Southern states.

The G. P. Keller Mfg. Co., Salt Lake City, Utah, maker of the "Keller" assay and analytical balances, has opened a department for the repair and adjustment of engineers' instruments—transits, levels, etc.—in charge of Mr. Gustav Warkentin, head of the firm of Warkentin & Krause, Leipzig, Germany, an expert in this line.

A. O. Krieger has resigned his position as Publicity Manager of the Busch-Sulzer Bros.-Diesel Engine Co., St. Louis, with whom he had been connected for a number of years, to open an office at 916 Victoria Building, St. Louis, for the sale of the Tacchella Oil Burning Device, a new device which will be suitable for domestic heating purposes, japanning and annealing ovens, baking ovens and cooking ranges.

The Sullivan Mchy. Co., Chicago, announces that they will hereafter maintain for the convenience of customers, a complete stock of parts and supplies for Sullivan continuous electric undercutters, compressed air punches, rock drills and hammer drills at Huntington, W. Va. A stock of parts at this point will, they feel, make them better able to serve their customers in West Virginia, Virginia, Southern Ohio and Eastern Kentucky.

Mr. R. L. Sites, formerly assistant to president of The W.m. J. Oliver Manufacturing Co., and who has represented this company in the New York territory for the last eighteen months, has been given an exclusive agency in this territory by the Oliver Company for the sale of the "Oliver" dump cars, spreaders, industrial cars, marble mill and mining equipment. Mr. Sites will retain his present suite of offices in 50 Church Street, New York City.

The Taylor Iron & Steel Company of High Bridge, N. J., announce the opening of an office in Pittsburgh, Penn., at 301 Oliver Bldg. Phone 2192 Grant. This office is opened as a result of the increasing demand for Tisco manganese steel castings in Pittsburgh and vicinity. The office will be in charge of James S. Morrison. In order to handle matters most expeditiously it is requested that all inquiries and orders for Tisco manganese steel castings from customers in this immediate vicinity be sent through the Pittsburgh office.

The Jeffrey Mfg. Co., have moved their Chicago headquarters and offices from the Fisher Bldg., to the McCormick Bldg., recently completed and which is considered the most modern and up to date fire-proof office building in Chicago. S. S. Shive, sales engineer, is the district manager in charge of the Chicago office, and Jeffrey customers and friends will find a welcome on the 17th floor where the Jeffrey offices are located. The Jeffrey Mfg. Co., maintain fourteen branch offices in the United States and over one-hundred agents in the leading commercial centers all over the world.

Mr. Leroy A. Kling, who has been connected for some time past with two well known crusher companies in Cedar Rapids, Iowa, has just accepted a position with the Wheeling Mold & Foundry Company, of Wheeling, W.Va., as Sales Manager of the Road Machinery Department. This is the concern that has built so much of the important machinery for the Panama Canal. They will eventually manufacture a complete line of road building machinery, including a modern crusher, adjustable to crush to any size, pulverizers, rolls, screens, elevators, trucks and graders. Mr. Kling announces that his connection with these people begins at once.

The Bethlehem Steel Company of South Bethlehem, Pa., manufacturers of Tool Steel, Armor Plate, Projectiles and other lines of High Grade Steels, have decided to install the Girod Electric Furnace which shall enable them to produce a much larger quantity of special steel.

It is claimed that the Girod Electric Furnace has given unusually good results in the manufacture of large heats of the better grade of steels, and that the prominent works in Europe were quick to take advantage of this new method making the higher grades of steel.

Fried. Krupp & Co., the well known steel manufacturers of Essen, Germany, also use the Girod Electric Furnace.

The first Girod furnace to be installed by the Bethlehem Steel Company will have a melting capacity of ten tons per heat.

The Ruggles-Coles Eng'r. Co., 50 Church St., New York City, tell us that recent experiments made at the laboratory of the Board of Water Supply, New York City, indicate that Monel metal possesses about the same resistance to corrosive action as the better known bronzes, while it had the additional advantage that it presented the least change in appearance as result of the corrosive action. Specimens of several bronzes, monel metal and steel were weighed and embedded in rich earth which was kept wet for six months by periodical additions of very dilute solutions of corrosive salts. At the end of the test period all of the specimens were taken out, scrubbed, dried, and weighed to ascertain the comparative loss from corrosion. The results in percentage of loss were as follows: Phosphor bronze 0.09; tobin bronze 0.11, monel metal 0.12, parsons manganese bronze 0.12, muntz metal 0.33, steel 1.04; Another test of the same kind under somewhat different conditions but the same period, gave about the same relative results.

The Standard Spiral Pipe Works, 25 No. Dearborn St., are placing on the market a reinforced galvanized spiral pipe which is made from two strips of steel of different widths and with a continuous interlocking seam. Both strips of steel are rolled to shape on the edges and are interlocked and rolled down under very high pressure in a special machine which this company have patented. The strips of steel are first cut to the required width from long sheets of steel and the ends are welded together. The steel is then placed on large spools. The strip used for the outside or reinforcing band comes from the steel mills in long lengths on reels. Both of these strips are fed into the machine at one end, rolled down interlocked in the machine, coming out at the other end in the shape of pipe. The pipe is smooth on the inside and has the reinforcing band running on the outside the entire length of the pipe, and can be made endless.

Within the last month the General Electric Company, Schenectady, N. Y., has received the following orders for multistage centrifugal air compressors for service as blast furnace blowers: One 25,000 cu.ft. per minute, 15 to 25 lbs. pressure compressor driven by a high pressure steam turbine from the E. & G. Brooke Co., Birdsboro, Penn. One 13,000 cu. ft. per minute 16 to 25 lbs. pressure compressor driven by a mixed pressure turbine, Chattanooga Coal & Iron Co., Chattanooga, Tenn. Three 40,000 cu.ft. per minute, 15 to 30 lbs. pressure compressors driven by high pressure steam turbines, Woodward Iron Co., Woodward, Ala. The General Electric Company has six multistage air compressors already installed as blast furnace blowers. The principal advantages of this type of compressor are said to be great saving of floor space, great saving in net weight, large saving in oil supplies and maintenance, and excellent control of required volume of air against whatever pressure may be required in the operation of the blast furnace. This close control of air is accomplished by a constant volumn governor which is one of the unique features of these blowing engines.

Among the recent sales made by the Dorr Cyanide Machinery Company, Denver, Colo., we include the following: One Dorr Continuous Thickener to El Tigre Mining Company, Yzabal, Sonora, Mexico. Two Dorr Classifiers and one Dorr Thickener to the Homestake Mining Company, Lead, S. Dak. One Classifier to the Ewana M'Cubwa Copper Company, Rhodesia, South Africa. One Classifier to the Motherlode Mining Co., Sheep Creek, B. C. Two Classifiers to the Goldroad Mining Co., Kingman, Ariz. One Classifier to W. B. A. Dingwall, Matehuala, S. L. P. Mexico. One Thickener to the Vulture Mines Co., Wickenburg, Ariz. One Classifier and one Thickener to the Cia. Minera Las Vaca, San Diego, Chili. Two Classifiers to the Tom Reed Gold Mines Co., Kingman, Ariz. One Classifier to Chas. Butters & Co., Ltd., Virginia City, Nevada. One Classifier and five Thickeners to the Ophir Gold Mines Milling & Power Co., Ophir, Colo. Three Thickeners to the Beck Mining Co., Atlantic City, Wyo. Four Thickeners to the U. S. Treasury Mining Co., Engle, N. M. Four Thickeners to the Blue Flag Mining Co., Victor, Colo. The last four named companies are installing continuous decantation process of cyaniding.